OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

AMERICAN

DYESTUFF REPORTER

DEVOTED TO TEXTILE CHEMISTRY • BLEACHING • DYEING • PRINTING • FINISHING

APRIL 2, 1951
VOLUME 40, No. 7

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The Key to BRIGHTER NAVIES

For lively overtones in men's wear navies, brilliant violets must be used to obtain the necessary brightness in the finished goods.

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...are among the most brilliant shades of chrome violet. They are level dyeing colors with the typical high wet fastness properties of chrome dyestuffs – fast to perspiration, washing and wet dry cleaning.

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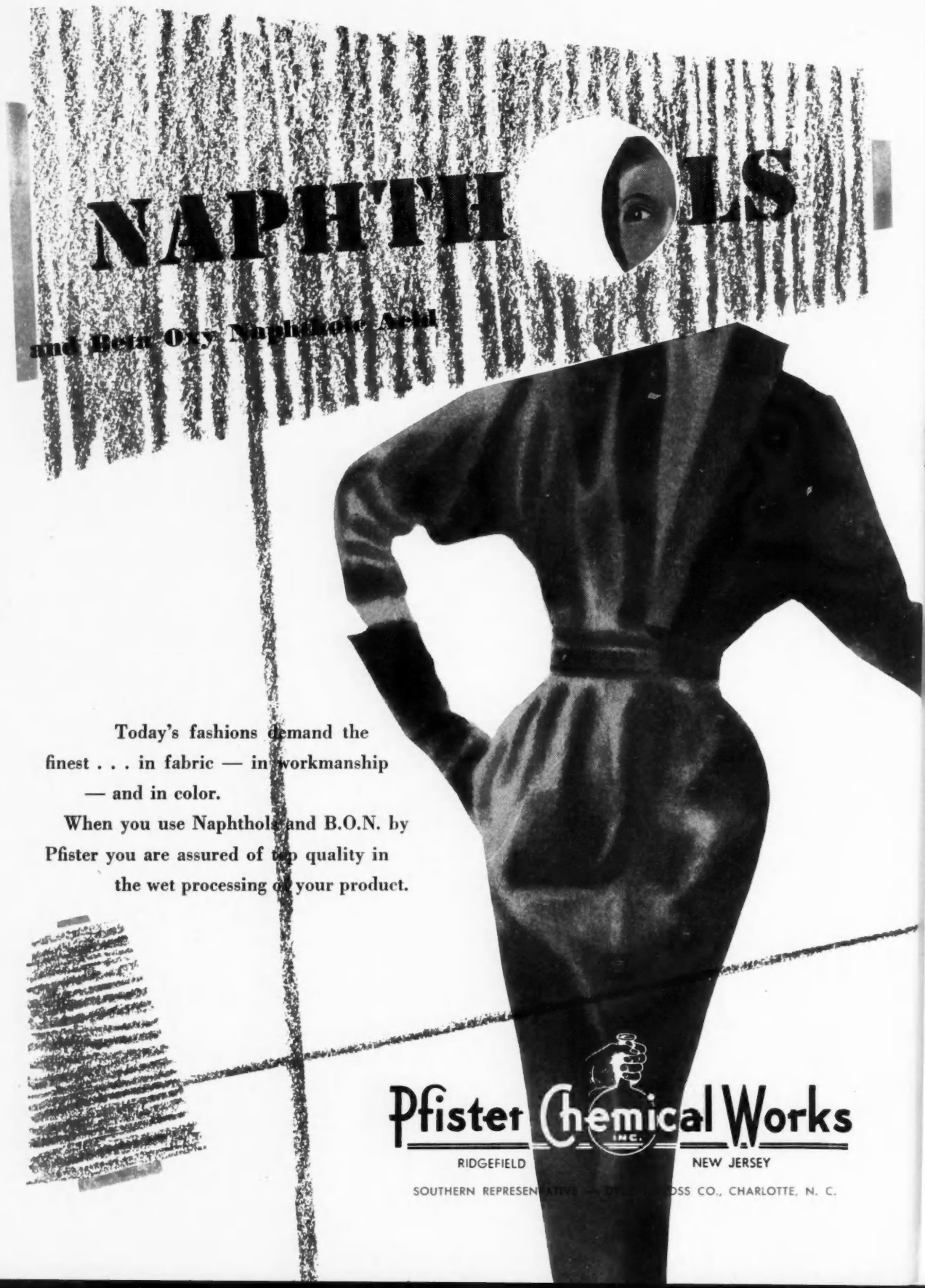
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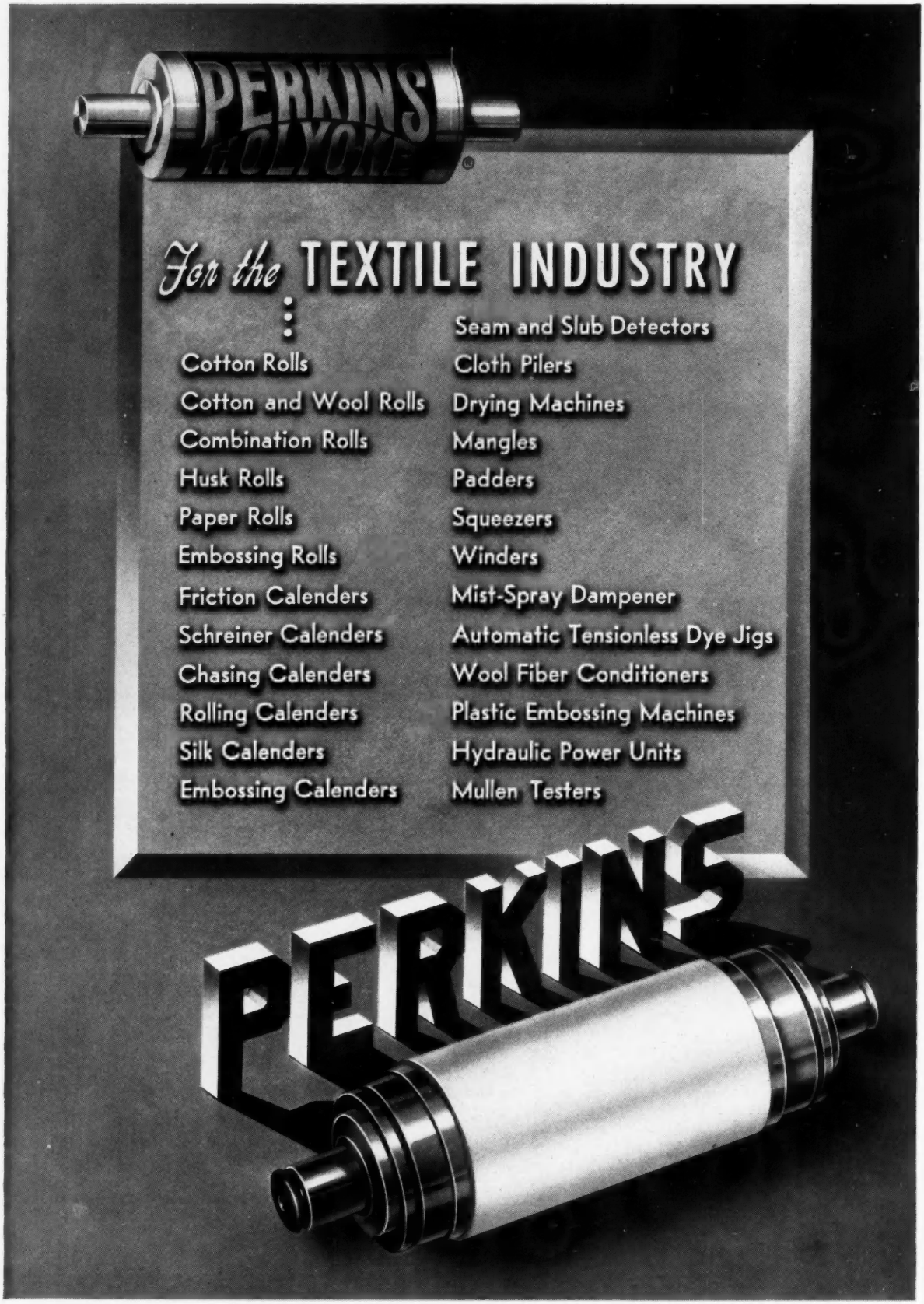

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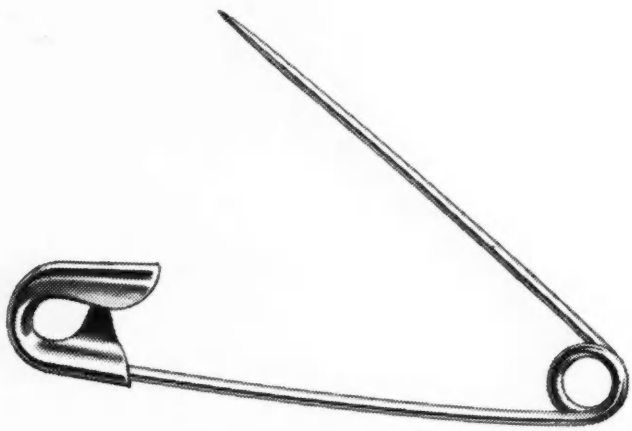

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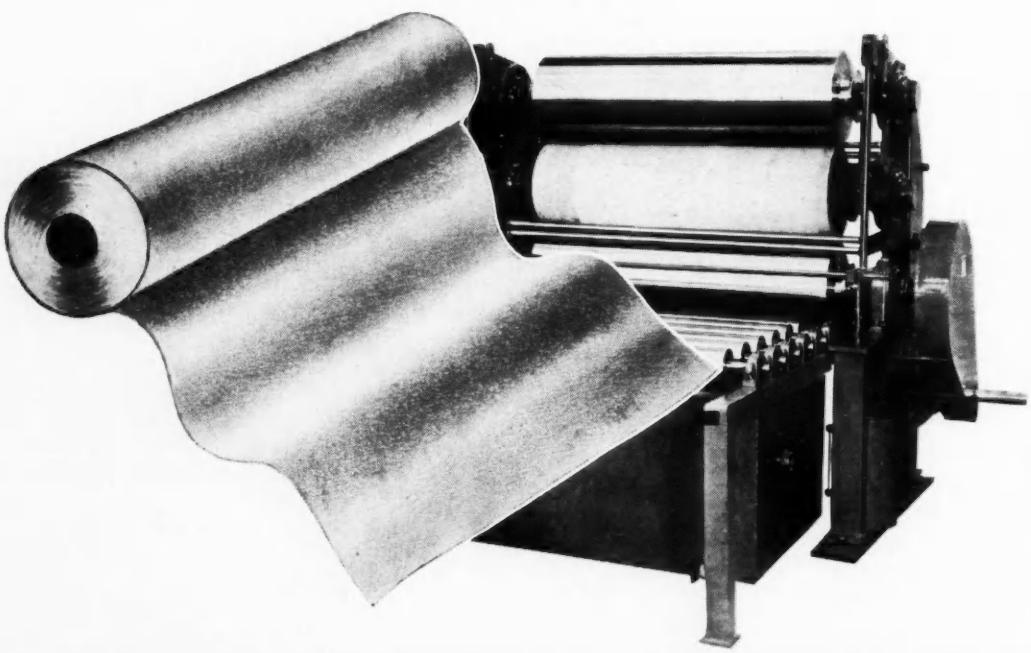

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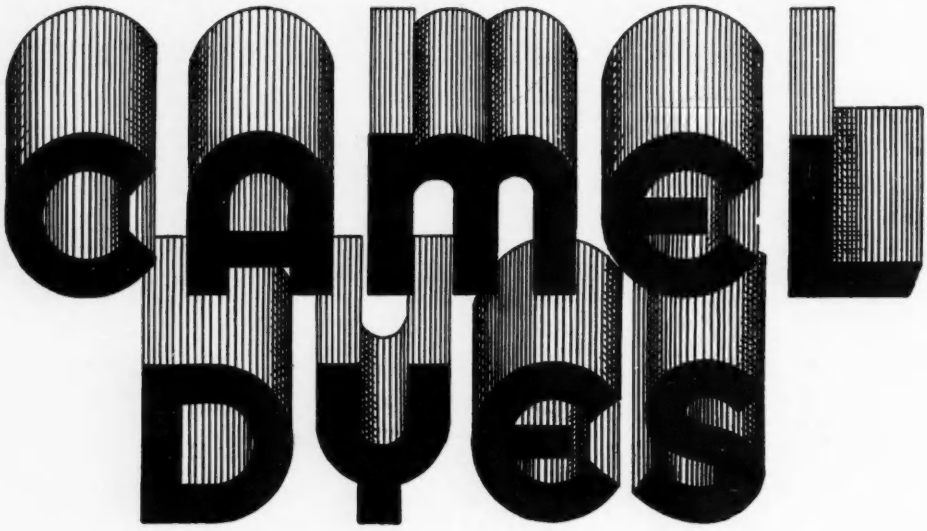

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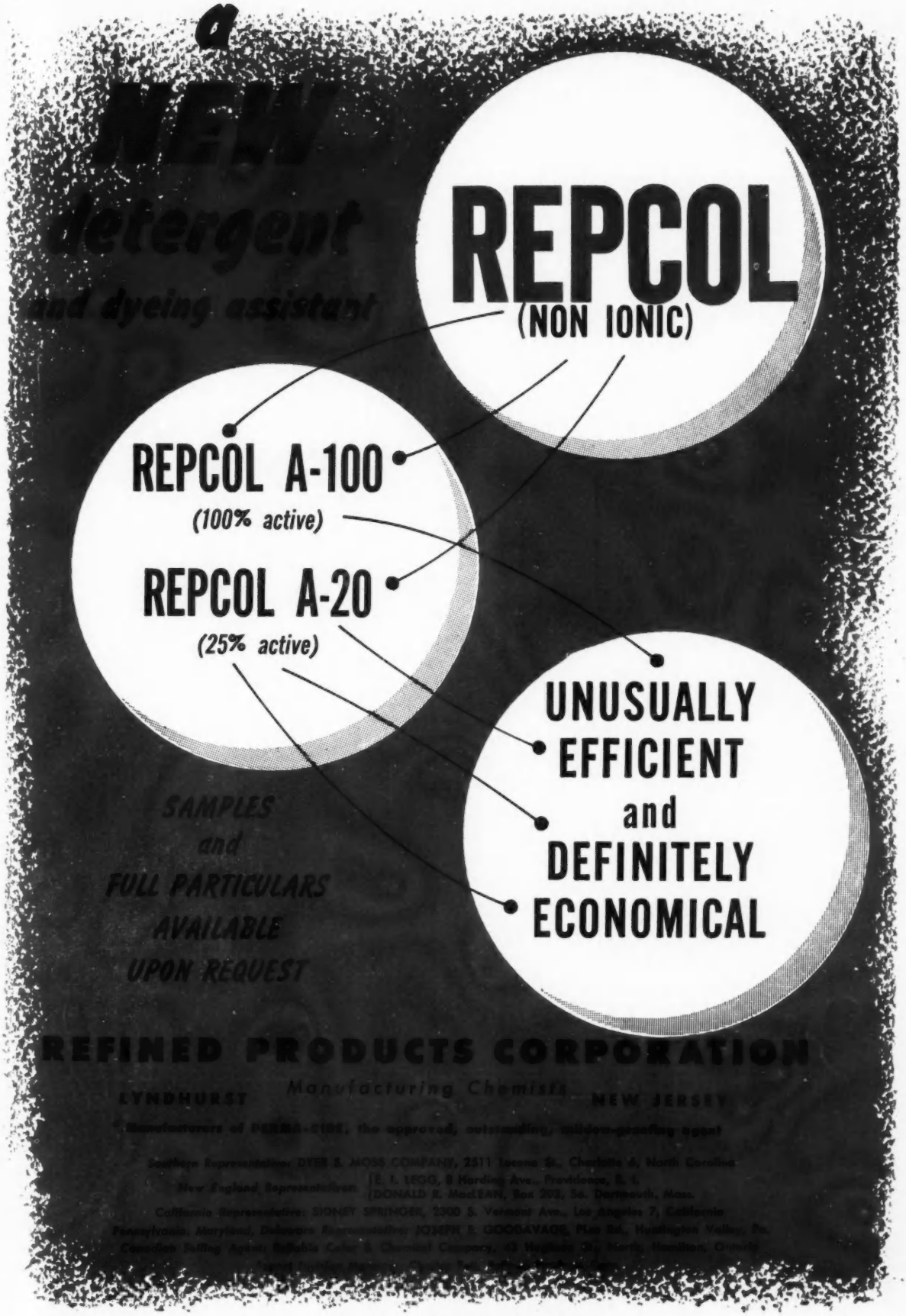
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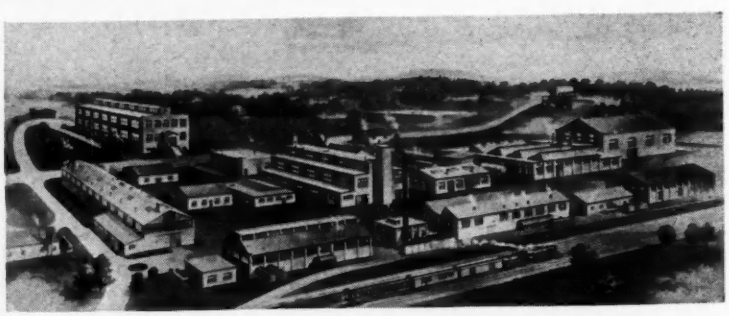

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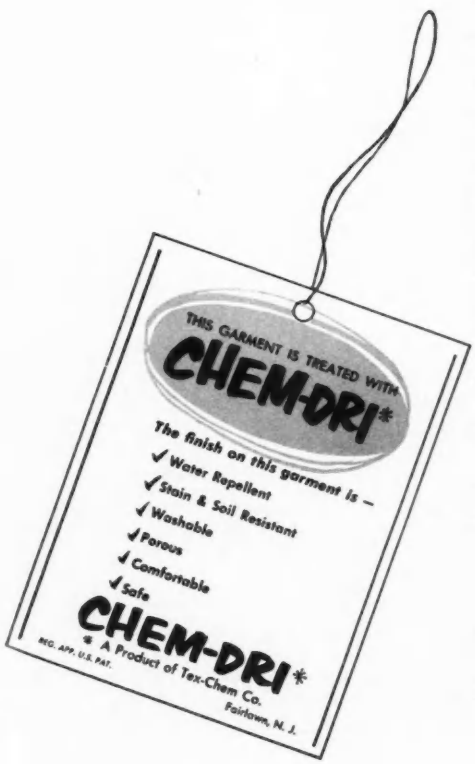

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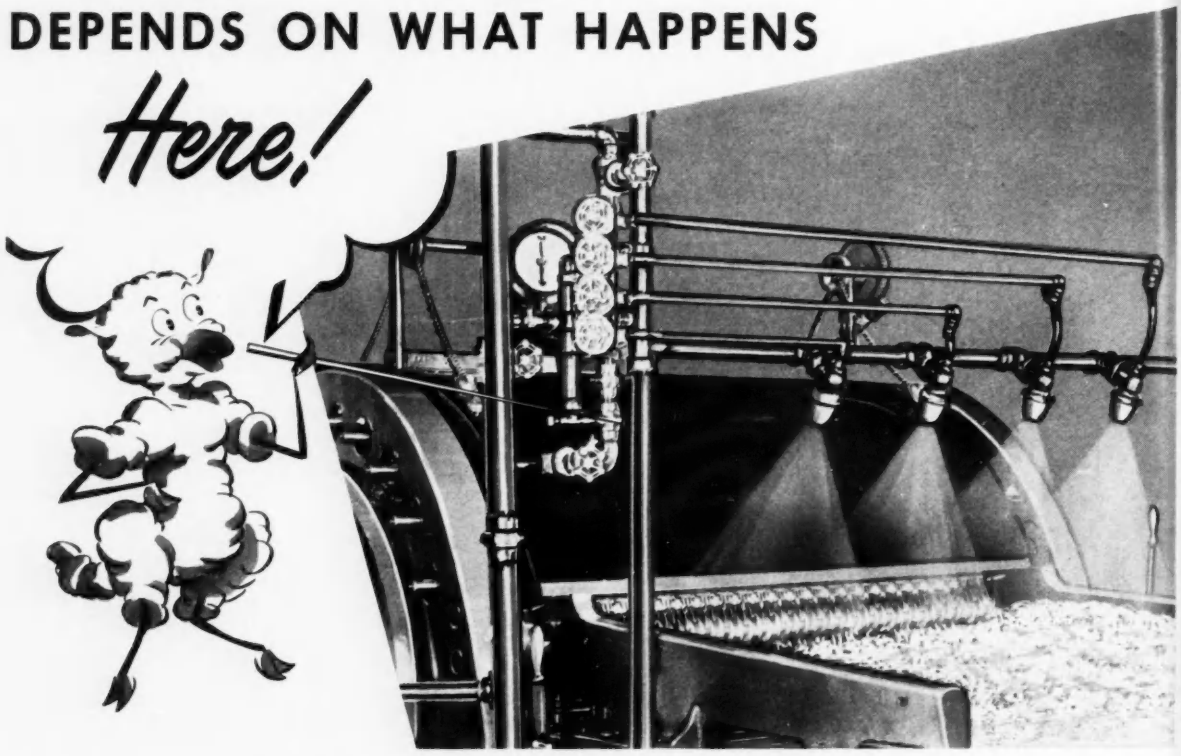

Leading woolen mills wisely select their wool oils with extreme care. The reason, of course, is that they know how much the oil's performance governs the success of the many operations which follow.

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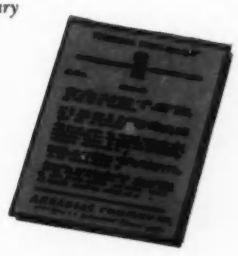

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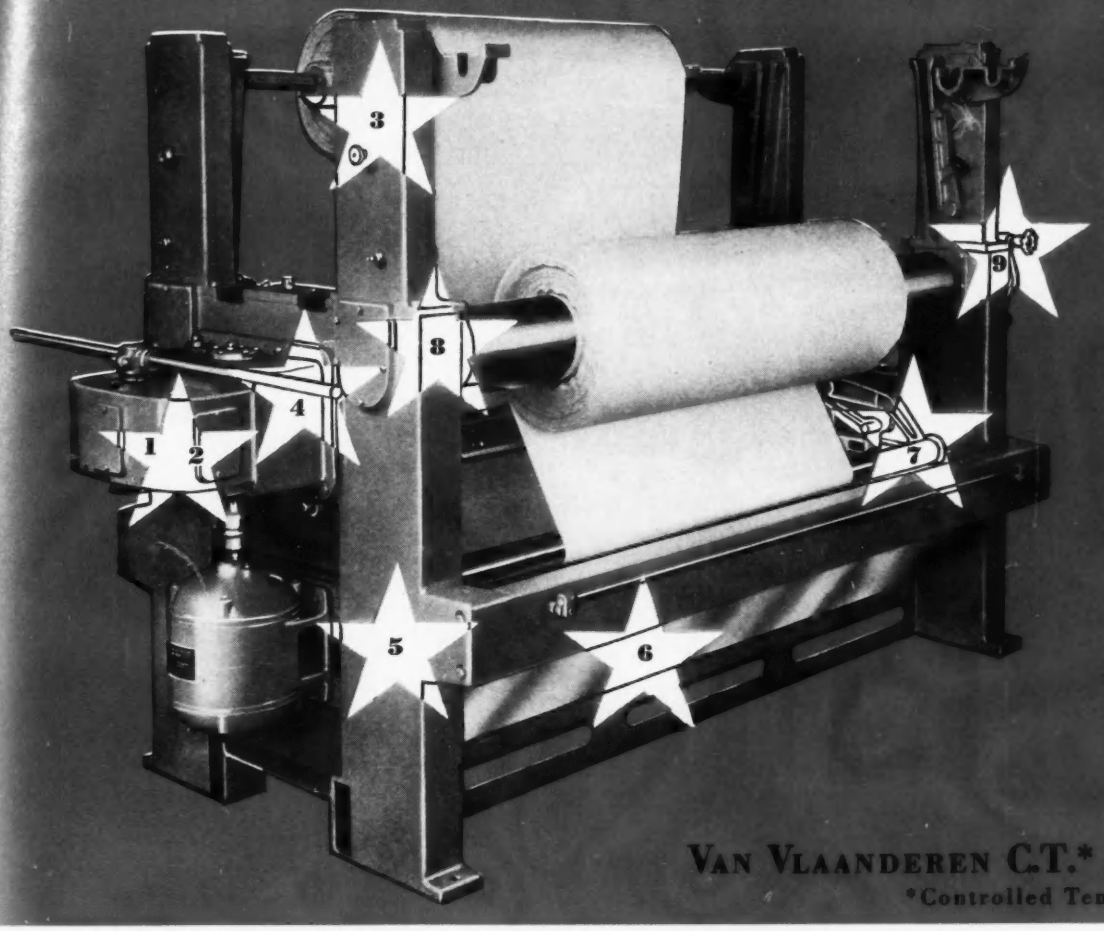

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Intersectional Contest——

THE STRIP-TESTER—AN INSTRUMENT DESIGNED TO MEASURE DIMENSIONAL CHANGE IN WOVEN RAYON FABRICS*

NEW YORK SECTION

Committee

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A new instrument, the Strip-Tester, was developed in an effort to eliminate or minimize certain undesirable characteristics pertaining to both the equipment and the procedures employed in recognized testing methods for determining rayon fabric shrinkage. The procedures outlined, for example, in AATCC Standard Test 14-33, CCC-T-191a, CS 59-44 or the Tension Presser method all require the use of large and expensive machinery; the methods are complex and time-consuming and must be performed by a laboratory technician. Furthermore, interlaboratory tests show wide discrepancies, and even tests performed in the same laboratory by the same operator often produce results that fluctuate beyond a reasonable amount. With such established facts upon which to base conclusions, no known test procedure can give accurate information on the consumer performance of a rayon fabric in laundering.

The Strip-Tester overcomes, to a considerable degree, most of these deficiencies; it is a small, relatively inexpensive apparatus; each test on a strip of fabric can be completed in less than ten minutes; test results from different laboratories at different times are highly reproducible and can be performed by persons who are not trained technicians.

The apparatus is of simple construction, consisting of a Pyrex cylinder in which the test strip is held upright between two clamps, the lower clamp being stationary, and the upper one connected with a balanced arm to which varying amounts of tension from zero upward may be applied. The arm itself is balanced on a ball-bearing and has affixed to it a pointer-indicator that operates over a scale that is calibrated in fractions of percentage (shrinkage or elongation). The lower opening of the cylinder can be sealed by a hinged metal closure to permit filling with water and opened to admit hot air from a blower, which swivels on the main support of the entire apparatus.

The test method involves only three simple operations:

1. Drying the fabric in a relaxed condition in the cylinder.
2. Wetting the strip with boiling water under the desired tension.
3. Drying the fabric and reading the percentage of dimensional change registered on the calibrated scale.

It should be noted that from the time the machine is set until the final reading is recorded the human element involved in pressing, measuring and converting into percentage has been entirely eliminated. Also, the progressive changes that occur in the fabric can be followed by observing the movement of the indicator throughout the wetting and drying operations.

The object of this paper will be to present a comparison of results of tests made on eight different fabrics by the Strip-Tester method, various currently used test procedures and both home and commercial laundering.

Arthur R Wachter

IT HAS long been acknowledged that certain undesirable characteristics pertain to both the equipment and the procedures employed in recognized testing methods for predicting the shrinkage of rayon fabrics in consumer use. The procedures outlined, for example, in AATCC Standard Test 14-33, CCC-T-191a, CS59-44, or the Tension-Presser method *(1)* not only require the use of large and expensive machinery, but the testing methods outlined are complex and time-consuming and must be performed by a laboratory technician. Furthermore, interlaboratory tests on a given fabric frequently show wide discrepancies in results, and even tests performed in one laboratory by one operator often produce results that fluctuate beyond a reasonable amount from one test to the next.

The instrument that is being presented herewith was originally conceived while work was being done under a research fellowship at Lowell Textile Institute, sponsored by American Viscose Corporation for the purpose of perfecting the Tension-Presser method of shrinkage determination. This latter method was considered the one most worthy of further development since it takes into consideration the restorability characteristics of rayon fabrics. However, evaluation of results is still predicated upon the human element involved in the exertion of varying tensions on the test sample during the performance of test operations and the unavoidable discrepancies that occur in the marking, measuring and computing of percentages.

This new instrument, appropriately named the Strip-Tester (Figure 1), overcomes to a considerable degree most of the deficiencies thus far mentioned as pertaining to the larger machines. It is a small, relatively inexpensive apparatus; each test on a strip of fabric can be completed in less than ten minutes; test results from different laboratories at different times are highly reproducible; and

* Presented before the 29th Annual Meeting in Portsmouth, N H, Sept 29, 1950.

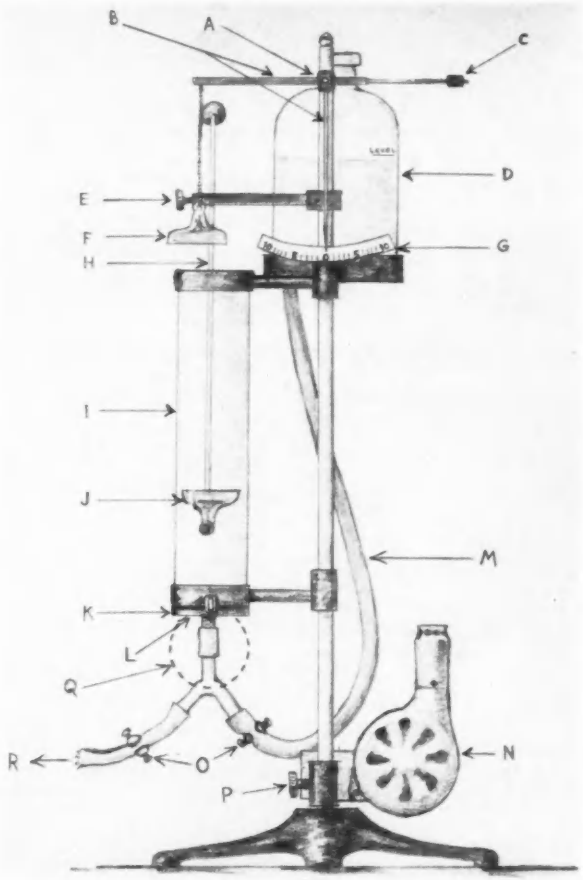

Figure 1

A—Ball-bearing fulcrum
B—Bar-arm & pointer assembly
C—Adjustable weight
D—Liquor vessel
E—Screw for securing stationary clamp
F—Movable clamp on chain from "B"
G—Scale calibrated in percentage
H—Adjustable support for "J"
I—Glass cylinder
J—Stationary clamp
K—Hinged closure
L—Clamp for closing "K"
M—Tube from liquor vessel "D"
N—Movable hot-air blower
O—Stop-flow clamps
P—Screw for securing "N"
Q—Position of "K" while "N" is in operation
R—Tube to compressed-gas supply

tests can be performed by individuals who are not trained laboratory technicians.

The apparatus is of simple construction, consisting of a Pyrex cylinder in which the test strip is held upright between two clamps, the lower clamp being stationary, and the upper one connected with a balanced arm, to which varying amounts of tension from zero upward may be applied. The arm itself is balanced on a ball-bearing mechanism and has affixed to it a pointer indicator, which operates over a scale that is calibrated in fractions of percentage (shrinkage or elongation). The bottom of the cylinder is closed by a hinged metal plate to permit filling with water, and it may be opened to admit hot air from the attached blower. This blower swivels on the main support of the entire apparatus.

After adjustment of the weight on the balanced arm to the desired tension, dimensional change is determined on the Strip-Tester according to the following procedures:

1) Raise lower clamp to required position above cylinder and secure lower end of fabric in clamp precisely along inner edge of measuring line.
2) Secure upper clamp to other end of strip, also along inner edge of measuring line.
3) Lower bottom clamp and fabric into cylinder. Support upper clamp by wire hook to edge of cylinder and secure adjustable support by thumbscrew at a position that leaves the strip completely relaxed in the cylinder.
4) Swing dryer into position beneath open cylinder and secure by thumbscrew.
5) Switch dryer on "HOT" and permit to operate for three minutes.
6) Switch dryer off, swing out of position and secure bottom closure of cylinder.
7) Remove upper clamp from wire hook and place on hook at end of chain from bar-arm assembly.
8) Adjust movable lower clamp support so pointer indicator rests directly over zero (0).
9) Fill cylinder with boiling tap water and leave in cylinder for two minutes.
10) Drain off water, open lower end of cylinder, place dryer into position under fabric and switch dryer on "HOT" for five minutes (or until pointer-indicator ceases to travel in either direction for at least thirty seconds after having come to rest).
11) Record change, plus or minus, to nearest 0.1%.

Step No 5 was introduced in order that all samples might be brought to substantially the same regain value when the zero setting is made on the instrument. This built-in control of regain value will make it possible to use the instrument in the mill or in laboratories where conditioning rooms are not available. Pre-drying is also recommended because it renders the fabric absolutely and immediately receptive to moisture.

It should be noted that, from the time the machine is set until the final reading is recorded, the human element, which is usually involved in pressing, measuring and converting into percentage by the other testing procedures, has been entirely eliminated. Also, if so desired, the progressive changes that occur in the fabric throughout the wetting and drying operations may be closely observed by following the movement of the indicator.

Many of the fluctuations observed in shrinkage test results on rayon fabrics have frequently been blamed on the fabric itself, it being assumed that a variation in shrinkage from piece to piece, or even from yard to yard, along the length of a single piece of fabric was an inherent characteristic of the cloth. Some of the early experimental work with the Strip-Tester tended to refute this assumption. In the instance illustrated by the first set of graphs (Figures 2a, 2b and 2c) an eighty-one-yard piece of fuji-type men's

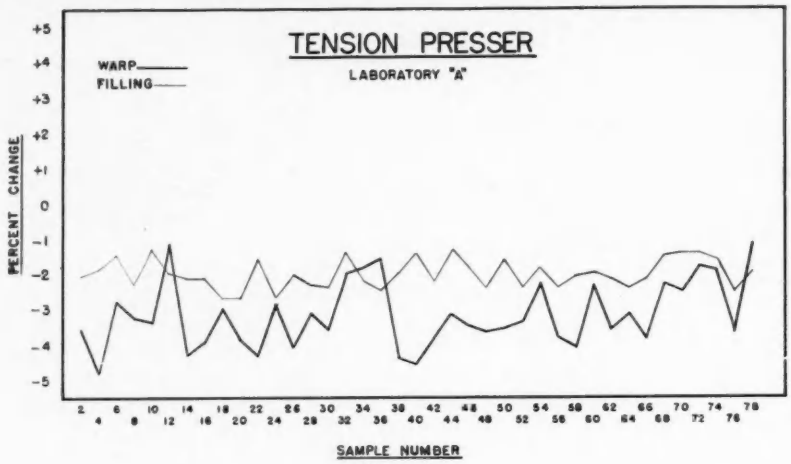

Figure 2a

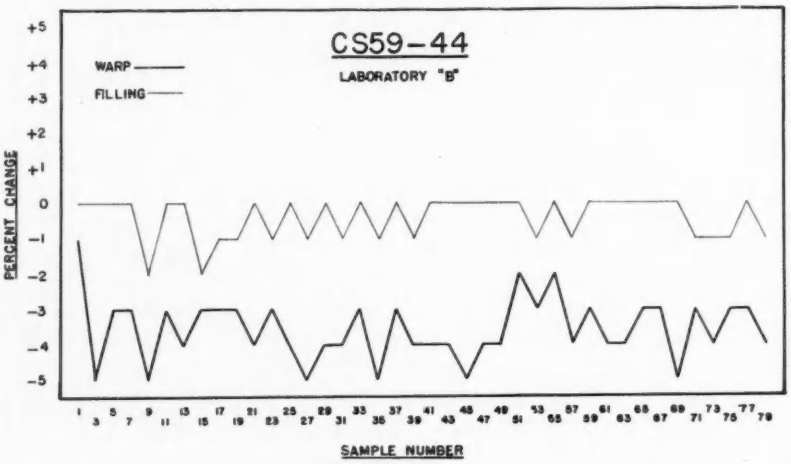

Figure 2b

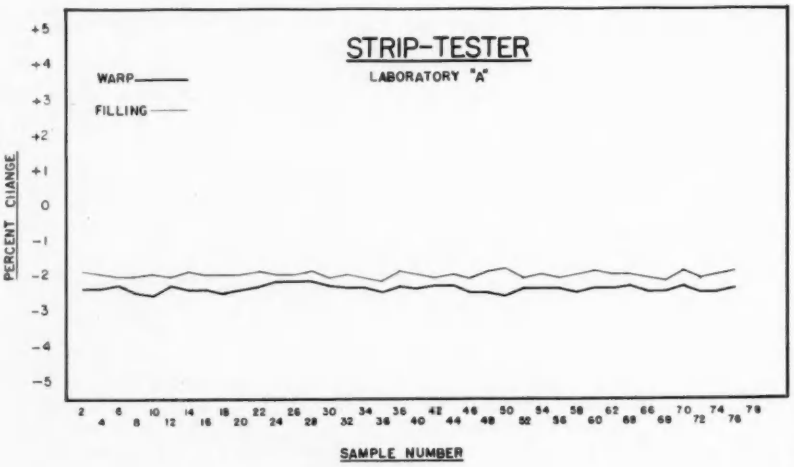

Figure 2c

shirting fabric was cut into one-yard lengths, and each alternate-numbered yard was sent to one of two laboratories for comparative shrinkage tests. As indicated, shrinkage tests were made according to CS59-44, on the Tension Presser, and on the Strip-Tester. As is graphically shown, in those cases where the human element was involved, exceedingly wide variations can be noted in the results, whereas results with the Strip-Tester show remarkably consistent results throughout the length of the eighty-one yards of cloth.

For the purpose of even further checking the reproducibility of the instrument, three strips were cut from different sections of the warp of this fabric and subjected to consecutive tests under varying tensions ranging from approximately one gram per inch (across the strip) to eighteen grams, with seventeen changes in tension. Samples #1 and #3 on the chart (Table I) were started at the higher tension, which was gradually reduced for each succeeding wetting, and Sample #2 was started at the lower tension, which was increased as the test progressed. As can be seen from Table I, at any given tension the greatest discrepancy between any two of the three strips was never greater than 3/10 of one per cent.

Throughout these initial tests it became apparent that the basic cause of inconsistencies lay not so much in the fabric as in the testing procedure. It is no problem in pressing the average damp fabric to alter a ten-inch dimension one-quarter of an inch in either the plus or minus direction. Add to this the ease with which an individual shrinkage measurement can deviate one-eighth of an inch either plus or minus by a slight finger pressure, and you have a combined extreme variation of 7.5%.

TABLE I

EFFECT OF TENSION ON RAYON SHRINKAGE AS DEMONSTRATED BY STRIP TESTER

Tension in Grams Per Inch Across Strip	*% Shrinkage Sample No 1*	*% Shrinkage Sample No 2*	*% Shrinkage Sample No 3*
0.94	7.0	6.9	6.9
1.37	6.9	7.0	6.9
1.79	6.9	7.0	7.0
2.12	7.0	7.1	7.1
2.52	7.0	7.0	6.8
2.92	7.0	7.0	6.9
3.32	6.6	6.8	6.7
3.72	6.5	6.6	6.5
4.10	5.8	5.8	5.9
6.00	5.2	5.1	5.1
7.32	4.7	4.4	4.6
9.24	3.8	3.6	3.7
1.03	3.1	3.0	3.0
12.80	2.3	2.2	2.2
14.52	2.1	2.1	2.1
16.80	0.7	0.6	0.6
18.02	0.3	0.3	0.2

Samples No 1 and 3 were started at higher tension, which was reduced as the test progressed.
Sample No 2 was started at low tension, which was increased as test progressed.

Once the reproducibility of results on the Strip-Tester was satisfactorily established, an effort was made to determine the manner in which the maximum shrinkage could be determined in the minimum elapsed time. The drying period being predicated upon the weight of the fabric, effort was directed toward exploring the variables that could be introduced into the wetting-out phase of the test.

In initial experiments fabrics were wet by gravity-feeding water from a one-gallon vessel set high on a platform at the back of the apparatus, into the cylinder through a duct in the bottom closure, and then draining it off by lowering the vessel. This soon proved impractical for a number of reasons: the water temperature varied upward as it absorbed heat from the cylinder (early tests were run with water at room temperature); the water rapidly became contaminated by dyestuff, finishes and floated-off fibers; and the operation was slow and awkward. Water was subsequently poured in from the top, complete wetting of the strip being thus obtained almost instantly, and then drained off through the bottom.

The first variable explored was that of water temperature. Experiments with various temperatures established the fact that water as close to the boil as possible resulted in maximum shrinkage. Incidentally, it may be of interest to note at this point that, when making some preliminary experimental runs of fifty consecutive wettings and dryings of a single strip under continuous tension, we felt that the progressive shrinkage of the strip might have been caused by the gradually increasing temperature of the water. However, when later trials were made with boiling water for each consecutive wetting, the same type of progressive shrinkage was again observed.

Next, the influence of a wetting agent upon shrinkage was observed. Trials run at different temperatures with from 0.1% to 0.5% of a standard commercial wetting agent produced such small variations in results in either direction (Tables II and III) that they had to be considered as having no significance. Much the same effect was noted when an attempt was made to introduce agitation into the water-bath (Tables IV & V). This was accomplished by injection of carbon dioxide under pressure through the outlet duct in the cylinder closure to create a turbulence in the water. This series of trials was run at several temperatures, both with and without the use of a wetting agent. As noted, this variation of the procedure had a slight negative effect on the shrinkage (possibly caused by the gas reducing the water temperature somewhat), and, in view of the negative results obtained from the use of wetting agents and from agitation, both were omitted from the test procedure.

Increase of the length of the period of immersion beyond two minutes also had no apparent effect on the shrinkage. Two minutes having been chosen arbitrarily as being sufficient to thoroughly saturate a rayon fabric in boiling water, comparative trials were run for five minutes and for ten minutes with no appreciable difference (Table VI). In fact on a rayon gabardine the averages for the two-minute and for the five-minute immersions were both exactly 4.9%, and that of the ten-minute immersion was

TABLE II

EFFECT OF USE OF WETTING AGENT
VISCOSE RAYON GABARDINE
(WARP DIRECTION)

Without Wetting Agent		*With Wetting Agent*	
Strip Number	*% Shrinkage*	*Strip Number*	*% Shrinkage*
4–A	5.0	5–A	3.8
4–B	5.1	5–B	3.9
4–C	5.3	5–C	4.2
4–D	5.2	5–D	4.2
4–E	5.2	5–E	4.2
4–F	5.2	5–F	4.2
4–G	5.2	5–G	4.1
4–H	5.1	5–H	4.1
4–I	5.0	5–I	3.9
4–J	5.0	5–J	3.9
Average	5.13%	*Average*	4.05%

Procedure:
1—Dry 3 min without tension.
2—Adjust to zero.
3—Wet out 1 min (204°F).
4—Dry 5 min.
5—Record change.

TABLE III

EFFECT OF USE OF WETTING AGENT
(AGITATED—NO TENSION)
ACETATE RAYON SATIN
(WARP DIRECTION)

With Wetting Agent		*Without Wetting Agent*	
Strip Number	*% Shrinkage*	*Strip Number*	*% Shrinkage*
1	1.9	1A	1.9
2	2.1	2A	2.1
3	2.2	3A	2.1
4	2.5	4A	2.1
5	2.2	5A	2.1
6	2.2	6A	2.2
7	2.1	7A	2.1
8A	2.2	8	2.4
9A	2.2	9	2.2
Average	2.18%	*Average*	2.13%

Procedure:
1—Dry 3 min.
2—Adjust to zero.
3—Wet out (160°F) 2 min.
4—Dry 3½ min.
5—Record change.

TABLE IV

EFFECT OF AGITATION DURING IMMERSION
ACETATE RAYON SATIN
(WARP DIRECTION)

With Agitation		*Without Agitation*	
Sample Number	*Percent Shrinkage*	*Sample Number*	*Percent Shrinkage*
1	—	1A	3.8+
2	3.7	2A	4.0+
3	3.1(?)	3A	4.2
4	3.6	4A	3.9
5	3.5	5A	4.0
6A	3.7+	6	4.2
7A	3.8+	7	3.9
8A	3.8+	8	3.9
9A	3.9	9	3.9
10A	4.0	10	4.1
Average	3.69%	*Average*	4.00%

Procedure:
1—Dry 3 min.
2—Adjust to zero.
3—Wet out 2½ min (no tension).
4—Dry 3½ min (no tension).
5—Record change.

TABLE V

EFFECT OF AGITATION DURING IMMERSION
VISCOSE RAYON GABARDINE
(WARP DIRECTION)

With Agitation		*Without Agitation*	
Strip Number	*% Shrinkage*	*Strip Number*	*% Shrinkage*
6–A	4.6	7–A	4.8
6–B	4.3	7–B	5.0
6–C	4.4	7–C	5.0
6–D	4.4	7–D	5.1
6–E	4.5	7–E	4.9
6–F	4.8	7–F	4.8
6–G	4.2	7–G	5.1
6–H	4.1	7–H	4.8
		Average	4.94%
6–I	4.0	7–I	4.0†
6–J	3.9	7–J	4.0*
Average	4.32%		

Procedure:
1—Dry without tension for 3 min.
2—Adjust to zero.
3—Wet 2 min at 204°F.
4—Dry for 5 min.
5—Record change.
†15 sec wet-out.
*30 sec wet-out.

TABLE VI

EFFECT OF LENGTH OF IMMERSION AT APPROX 205°F
VISCOSE RAYON GABARDINE
(WARP DIRECTION)

2 Minutes Immersion		*5 Minutes Immersion*		*10 Minutes Immersion*	
Strip Number	*% Shrinkage*	*Strip Number*	*% Shrinkage*	*Strip Number*	*% Shrinkage*
1–A	4.8	2–A	5.1	3–A	5.1
1–B	4.9	2–B	5.0	3–B	5.0
1–C	5.1	2–C	5.2	3–C	5.3
1–D	4.9	2–D	4.9	3–D	5.2
1–E	5.0	2–E	5.1	3–E	5.6
1–F	4.8	2–F	5.0	3–F	5.3
1–G	5	2–G	5.2	3–G	5.4
1–H	4.9	2–H	4.7	3–H	5.2
1–I	5.0	2–I	4.4	3–I	(†)5.2
1–J	4.8	2–J	4.4	3–J	(*)5.1
Avg	4.9%	Avg	4.9%	Avg	5.2%

Procedure:
1—Dry 3 min.
2—Adjust to zero.
3—Wet out (various periods as indicated).
4—Dry 5 min.
5—Record change.
(†) 1 minute immersion.
(*) 30 seconds immersion.

only 0.3% higher. Two strips that were from the same section of fabric as the ten-minute test samples were immersed for thirty seconds and one minute respectively. The one-minute strip showed exactly the same shrinkage as the ten-minute average and the thirty-second one showed only 0.1% less.

The final and most important variable and one, incidentally, for which an optimum value has not been established to date, was the tension required to secure shrinkage readings comparable with those obtained by standard test methods or that could, with reasonable accuracy, predict the results of home or commercial laundering.

As a starting point an attempt was made to correlate the results obtained using the Strip-Tester with the results of tests performed according to the AATCC Standard Test 14-33 (identical with CCC-T-191a, Cotton Method). Eighteen-inch test squares and ten-inch strips were cut from an acetate satin and a viscose gabardine as per Figure 3. Squares "A" and "B" were sent to two commercial testing laboratories, respectively, for testing according to AATCC Method 14-33, and the strips were run in the Strip-Tester under 36.5 grams of tension. Since the maximum shrinkage usually occurs in the warp direction, only these figures were used as a basis for comparison, the results being shown in Table VII.

The test results obtained by the two laboratories on the two fabrics tested were too diverse to admit drawing any satisfactory conclusions. It was therefore decided to broaden the scope of this project considerably in order to cover a wide range of fabric constructions and to make comparisons not only between two test procedures but also with results obtained in home and commercial laundering.

TABLE VII

COMPARISON OF STANDARD TEST AND STRIP TESTER RESULTS

	Acetate Satin (Warp)	*Viscose Gabardine (Warp)*
Laboratory "A" (Per AATCC 14-33)	—5.3% —5.0%	—5.2% —4.7%
Laboratory "B" (Per AATCC 14-33)	—2.0% —2.0%	—4.0% —4.0%
Strip-Tester (Average of ten strips)	—2.12%	—4.94%

For the purpose of making this comparative study, eight seventy-five-yard lengths of different rayon fabrics were purchased in as wide a variety of constructions as was practicable. The fabrics, as numbered in this study, are described as follows:

FABRIC No 1

Type: Tackle Twill
Warp: Viscose Rayon (Filament)
Filling: Cotton
Finished Count: 164x74
Weight: 5.51 oz per square yard
Tensile Strength (warp-dry): 111.0 pounds per inch
Elongation (warp-dry): 23.9% per inch

FABRIC No 2

Type: Fuji Shirting
Warp: Viscose Rayon (Filament)
Filling: Viscose & Acetate Rayon (Staple)
Finished Count: 124x74
Weight: 3.34 oz per square yard
Tensile Strength (warp-dry): 66.9 pounds per inch
Elongation (warp-dry): 22.1% per inch

FABRIC No 3

Type: Five-Shaft Satin
Warp: Acetate Rayon (Filament)
Filling: Acetate Rayon (Filament)
Finished Count: 202x68
Weight: 3.15 oz per square yard
Tensile Strength (warp-dry): 36.9 pounds per inch
Elongation (warp-dry): 12.0% per inch

FABRIC No 4

Type: Linen Weave
Warp: Viscose Rayon (Staple) & Cotton
Filling: Viscose Rayon (Staple) & Cotton
Finished Count: 49x42
Weight: 5.20 oz per square yard
Tensile Strength (warp-dry): 52.7 pounds per inch
Elongation (warp-dry): 9.7% per inch

FABRIC No 5

Type: Gabardine
Warp: Viscose Rayon (Staple)
Filling: Viscose Rayon (Staple)
Finished Count: 132x64
Weight: 5.44 oz per square yard
Tensile Strength (warp-dry): 94.3 pounds per inch
Elongation (warp-dry): 15.8% per inch

FABRIC No 6

Type: Printed Spun
Warp: Viscose Rayon (Staple)
Filling: Viscose Rayon (Staple)
Finished Count: 128x94
Weight: 3.00 oz per square yard
Tensile Strength (warp-dry): 49.3 pounds per inch
Elongation (warp-dry): 19.5% per inch

FABRIC No 7

Type: Printed Taffeta
Warp: Pigmented Viscose Rayon (Filament)
Filling: Pigmented Viscose Rayon (Filament)
Finished Count: 98x76
Weight: 2.83 oz per square yard
Tensile Strength (warp-dry): 45.5 pounds per inch
Elongation (warp-dry): 22.5% per inch

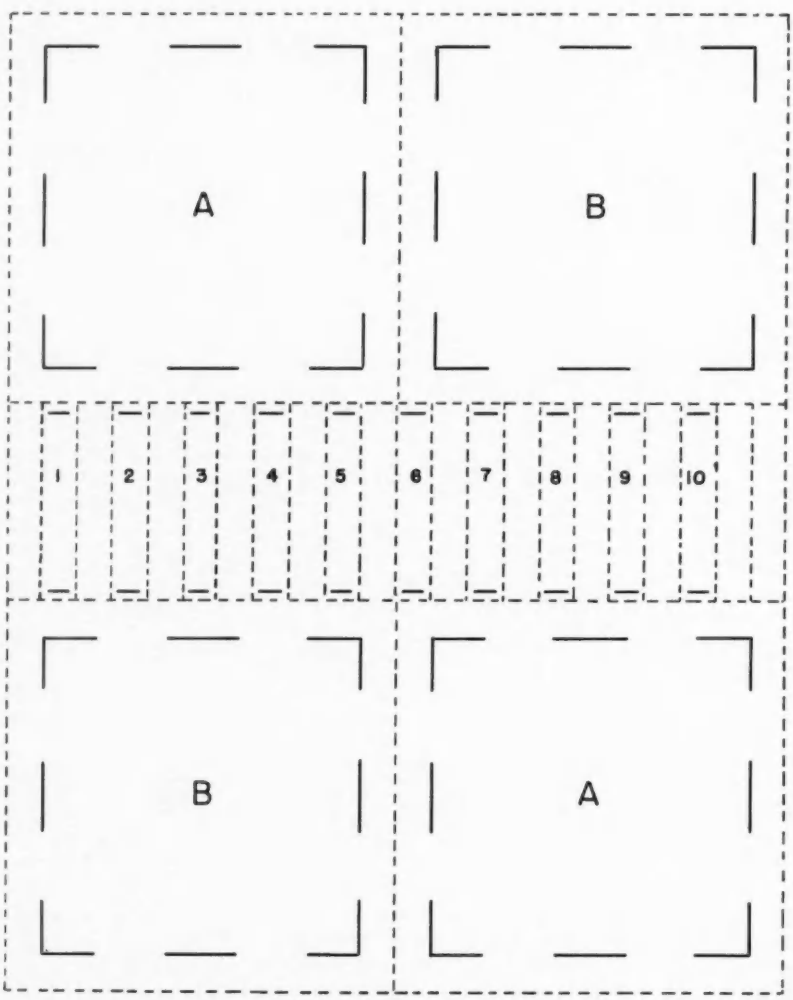

Figure 3

FABRIC No 8

Type: Printed Crepe
Warp: Viscose Rayon (Filament)
Filling: Viscose Rayon (Filament)
(2 Picks 60 Turns Z Twist—2 Picks 60 Turns S Twist)
Finished Count: 132x78
Weight: 3.39 oz per square yard
Tensile Strength (warp-dry): 47.8 pounds per inch
Elongation (warp-dry): 27.3% per inch

These were all one-piece cuts to avoid any deviations that might possibly occur in different dye lots. Furthermore, in order to eliminate any variations that might occur in using the more conventional methods of marking fabrics for testing, an entirely new method was devised for uniformly marking all the fabrics selected for this project. A special silk printing screen was prepared measuring 54" long by 31" wide, upon which was etched a pattern of cutting and measuring lines for the guidance of the technicians in each of the four laboratories who agreed to co-operate in this undertaking. The fabrics were laid out on eighty-yard tables, absolutely without tension or pinning of any sort, and screen-printed with a specially prepared dye that could be cured without tension and yet be fast to severe laundering tests. Each screen impression, termed a "Block" (Figure 4) and subsequently numbered, contained two 18-inch squares for various types of laundering tests and twenty 10-inch strips (ten warp and ten filling) to be subjected to the Strip-Tester. Each of the four co-operating laboratories, having been supplied with identical Strip-Testers, was then furnished with ten blocks of each of the eight fabrics, making a total of over seven thousand test samples for comparison.

The eighteen-inch marked squares (22" overall) were divided into groups, each of which was subjected to one of the following treatments: 1—AATCC Standard Test 14-33; 2—commercial laundering and pressing flat without shaping; 3—commercial laundering and pressing flat with shaping; 4—home washer at 105°F and hand-ironed; 5—home washer at 140°F, hand ironed; 6—home washer at 95° - 100°F, flat - bed pressed; 7 — home washer at 100°F flat - bed pressed and restored on the Tension Presser.

The ten-inch strips were also divided into groups for testing in the Strip-Tester under 40, 30 and 20 grams of tension, respectively, by each of the four laboratories. It should be especially noted that, in all instances where comparisons are made between AATCC and Strip-Tester results, both the squares and the strips were cut from the same "Block" of fabric.

As previously stated, the optimum tension to be applied to a strip of any given fabric in order to predict what will happen in consumer use has not yet been definitely established. However, as can be seen from the tabulation of comparative results, (Tables VIII, IX, X, & XI) the Strip-Tester results of tests performed with 40 grams of tension more frequently approach shrinkage values obtained after five commercial launderings (with reshaping) than do the tests made with 30 or 20 grams of tension. Although, as has been demonstrated, the resulting shrinkage can be fairly accurately controlled by adjustment of the tension, the wide fluctuations of standard test methods and consumer practices make it difficult to place the tension at any given amount in order to correlate results. Further investiga-

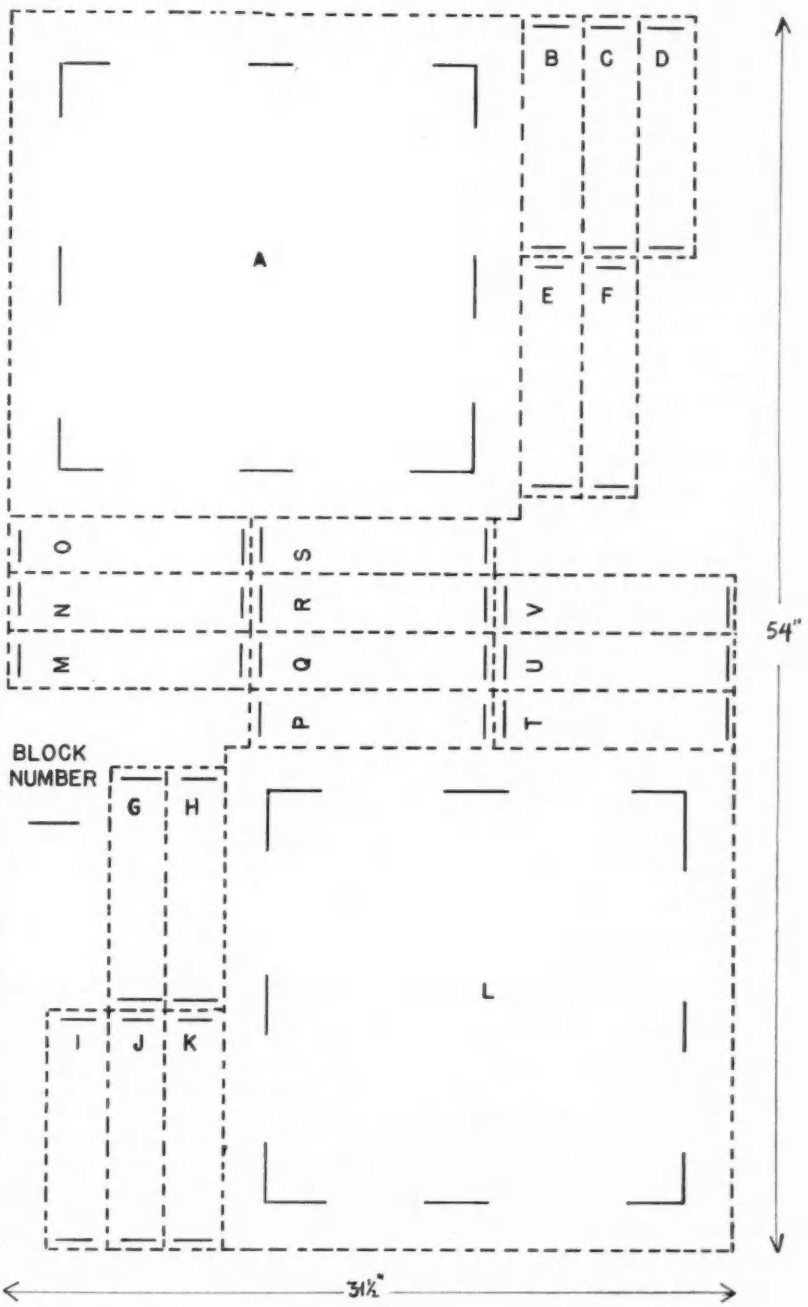

Figure 4

tion relative to this tension factor should take into consideration such physical fabric characteristics as construction, weight, tensile strength, and elongation before the break to determine what, if any, influence each of these factors has on the resulting dimensional change.

Since it would become highly confusing, if not impossible, to verbalize the comparisons that resulted from the study, reference is made to the accompanying illustrations.

After due consideration of these figures it appears obvious that a great deal of work still remains to be done. There have been made clear, however, a number of factors that should be subjected to particular investigation. In the first place,

TABLE VIII

TESTED IN ACCORDANCE WITH AATCC 14–33

	Fabric No 1		Fabric No 2		Fabric No 3		Fabric No 4		Fabric No 5		Fabric No 6		Fabric No 7		Fabric No 8	
	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling
AVC	−4.0	−1.0	−1.8	+1.3	−3.5	−0.5	−2.5	−3.0	−3.5	−1.0	−3.3	−4.8	−0.8	−0.5	−8.5	−5.8
BFTB	−3.5	−0.5	−2.3	+0.8	−2.5	−0.3	−2.8	−1.5	−2.5	−0.5	−3.5	−3.5	−1.0	+1.0	−9.3	−4.8
GHI	−2.2	−0.4	−2.1	0.0	−3.9	−2.0	−1.8	−1.7	−2.6	−0.4	−2.1	−2.3	−1.5	−1.4	−5.6	−2.8
JCP	−3.1	−0.8	−1.1	+1.6	−6.1	−5.0	−2.4	−2.6	−3.0	−0.8	−2.1	−3.8	−2.1	+1.0	−8.9	−6.3
Average	−3.2	−0.7	−1.8	+0.9	−4.0	−2.0	−2.4	−2.2	−2.9	−0.8	−2.8	−3.6	−1.4	+0.1	−8.1	−4.9
Diff Between Extremes	1.8	0.6	1.2	1.6	3.6	4.7	1.0	1.5	1.0	0.6	1.4	2.5	1.3	2.4	3.7	3.5
STRIP-TESTER TENSION AT 40 GRAMS																
AVC	−4.4	0.0	−2.2	+0.8	−1.4	+1.5	−0.8	+1.1	−2.7	−0.7	−0.4	−2.2	+0.3	−1.8	−4.6	+1.4
BFTB	−4.3	+0.1	−2.2	+0.9	−1.7	+1.9	−0.7	+1.4	−2.1	−0.8	−1.9	−2.0	−0.6	−2.4	−4.3	+2.4
GHI	−3.9	+0.4	−1.8	+1.1	−1.7	+0.7	−1.0	+1.2	−2.3	−1.2	−0.1	−2.1	−0.3	−1.4	−2.8	+2.7
JCP	−4.0	+0.2	−1.8	+0.9	−1.2	+1.8	−1.1	+1.0	−2.5	−0.9	−0.1	−2.2	−1.4	−2.1	−2.9	+1.5
Average	−4.2	+0.2	−2.0	+0.9	−1.5	+1.5	−0.9	+1.2	−2.4	−0.9	−0.6	−2.1	−0.5	−1.9	−3.7	+2.0
Diff Between Extremes	0.5	0.4	0.4	0.3	0.5	1.2	0.4	0.3	0.6	0.5	1.8	0.2	1.7	1.0	1.8	1.3
COMMERCIAL LAUNDERING—NOT SHAPED BEFORE PRESSING																
1 Time	−2.7	−0.9	−1.4	+1.2	−2.3	−1.6	−1.7	−2.6	−2.8	−0.7	−3.5	−4.2	−0.7	+1.4	−6.4	−2.8
2 Times	−3.4	−1.0	−1.4	+1.7	−3.0	−2.1	−2.6	−2.4	−3.3	−0.7	−3.5	−3.6	−1.4	+0.9	−6.4	−2.2
5 Times	−4.9	−1.4	−2.3	+1.6	−4.7	−3.1	−3.5	−2.8	−3.8	−0.9	−4.0	−4.2	−1.6	+0.9	−7.6	−3.8
COMMERCIAL LAUNDERING—RESHAPED BEFORE PRESSING																
1 Time	−2.4	0.0	−1.4	+2.1	−2.1	−0.3	−2.1	0.0	−2.8	0.0	−3.1	−2.1	−0.7	+2.8	−2.8	+2.1
2 Times	−3.1	−0.7	−2.4	+2.8	−3.1	−0.7	−2.1	−1.4	−3.1	−0.3	−4.2	−2.8	−0.7	+2.4	−2.8	+0.7
3 Times	−4.2	−0.7	−2.4	+2.1	−4.2	−1.7	−3.5	−2.1	−3.5	0.0	−3.1	−2.1	0.0	+2.1	−3.1	+0.7
4 Times	−4.2	−0.7	−2.1	+1.7	−4.5	−1.0	−3.5	−1.4	−3.1	+0.3	−3.8	−2.4	−0.7	+2.1	−5.2	−3.1
5 Times	−3.8	−0.7	−1.7	+1.7	−4.2	−0.3	−3.8	0.0	−3.5	0.0	−4.2	−2.8	−0.7	+2.8	−4.2	−3.5

TABLE IX

TESTED IN ACCORDANCE WITH AATCC 14–33

	Fabric No. 1		Fabric No. 2		Fabric No. 3		Fabric No. 4		Fabric No. 5		Fabric No. 6		Fabric No. 7		Fabric No. 8	
	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling
AVC	−3.8	−1.0	−1.8	+1.3	−2.3	−0.5	—	—	−3.8	−0.8	−3.3	−3.5	—	—	−8.8	−4.3
BFTB	−3.0	−0.8	−1.3	+1.0	−2.3	−1.0	−2.0	−2.0	−3.0	−0.8	−3.5	−3.5	−1.0	+1.3	−8.3	−3.3
GHI	—	—	−1.7	+0.3	−7.5	−2.0	−3.0	−3.0	−4.6	−1.0	−5.0	−4.6	−2.5	−1.5	−9.5	−4.4
JCP	−2.7	−0.9	−0.8	+1.7	−4.3	−3.2	−2.2	−2.3	−3.2	−0.4	−3.3	−3.4	−2.5	+0.2	−7.3	−5.1
Average	−3.2	−0.9	−1.4	+1.1	−4.1	−1.7	−2.4	−2.4	−3.2	−0.8	−3.8	−3.8	−2.0	0.0	−8.5	−4.3
Diff Between Extremes	1.1	0.2	1.0	1.4	5.2	2.7	1.0	1.0	1.6	0.6	1.7	1.2	1.5	2.8	2.2	1.8
STRIP-TESTER TENSION AT 30 GRAMS																
AVC	−4.7	−0.2	−3.0	+0.3	−1.6	+1.2	—	—	−4.5	−1.7	−2.7	−2.9	—	—	−6.1	+1.1
BFTB	−3.9	+0.2	−2.6	+0.5	−1.7	+1.3	−0.9	+0.7	−3.4	−1.5	−2.5	−3.0	−1.7	−2.0	−4.3	+2.1
GHI	—	—	−2.6	+0.8	−1.7	+0.4	−1.0	+0.4	−2.1	−1.4	−0.7	−2.9	−1.0	−2.5	−4.7	+1.9
JCP	−4.5	−0.3	−2.7	+0.3	−1.6	+2.1	−1.2	+0.2	−3.5	−1.5	−2.9	−3.7	−2.6	−2.4	−5.2	+1.8
Average	−4.4	−0.3	−2.7	+0.5	−1.7	+1.3	−1.0	+0.4	−3.4	−1.5	−2.2	−3.1	−1.8	−2.3	−5.1	+1.7
Diff Between Extremes	0.8	0.5	0.4	0.3	0.1	1.7	0.3	0.5	2.3	0.3	2.2	0.8	1.6	0.5	1.8	1.0
COMMERCIAL LAUNDERING—NOT SHAPED BEFORE PRESSING																
1 Time	−2.7	−0.9	−1.4	+1.2	−2.3	−1.6	−1.7	−2.4	−2.8	−0.7	−3.5	−4.2	−0.7	+1.4	−6.4	−2.8
2 Times	−3.4	−1.0	−1.4	+1.7	−3.0	−2.1	−2.6	−2.6	−3.3	−0.7	−3.5	−3.6	−1.4	+0.9	−6.4	−2.2
5 Times	−4.9	−1.4	−2.3	+1.6	−4.7	−3.1	−3.5	−2.8	−3.8	−0.9	−4.0	−4.2	−1.6	+0.9	−7.6	−3.8
COMMERCIAL LAUNDERING—RESHAPED BEFORE PRESSING																
1 Time	−2.4	0.0	−1.4	+2.1	−2.1	−0.3	−2.1	0.0	−2.8	0.0	−3.1	−2.1	−0.7	+2.8	−2.8	+2.1
2 Times	−3.1	−0.7	−2.4	+2.8	−3.1	−0.7	−2.1	−1.4	−3.1	−0.3	−4.2	−2.8	−0.7	+2.4	−2.8	+0.7
3 Times	−4.2	−0.7	−2.4	+2.1	−4.2	−1.7	−3.5	−2.1	−3.5	0.0	−3.1	−2.1	0.0	+2.1	−3.1	+0.7
4 Times	−4.2	−0.7	−2.1	+1.7	−4.5	−1.0	−3.5	−1.4	−3.1	+0.3	−3.8	−2.4	−0.7	+2.1	−5.2	−3.1
5 Times	−3.8	−0.7	−1.7	+1.7	−4.2	−0.3	−3.8	0.0	−3.5	0.0	−4.2	−2.8	−0.7	+2.8	−4.2	−3.5

TABLE X

TESTED IN ACCORDANCE WITH A A T C C 14–33

	Fabric No. 1		Fabric No. 2		Fabric No. 3		Fabric No. 4		Fabric No. 5		Fabric No. 6		Fabric No. 7		Fabric No. 8	
	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling
AVC	−4.3	−1.5	−1.8	+0.8	−2.5	−1.0	−2.5	−1.8	−2.8	−1.5	−2.8	−3.5	—	—	−8.8	−4.8
BFTB	−3.0	−0.5	−2.3	+1.3	−2.0	−1.0	−2.8	−2.3	−2.5	−0.8	−3.5	−3.8	−1.3	−0.5	−8.0	−3.5
GHI	—	—	−1.8	+0.6	−6.8	−2.7	−2.7	−3.2	−4.0	−0.5	−5.1	−4.1	−2.5	−1.8	−10.2	−3.3
JCP	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average	−3.7	−1.0	−2.0	+0.9	−3.8	−1.6	−2.7	−2.4	−3.1	−0.9	−3.8	−3.8	−1.9	−1.2	−9.0	−3.9
Diff Between Extremes	1.3	1.0	0.5	0.7	4.8	1.7	0.3	1.4	1.5	1.0	2.3	0.6	1.2	1.3	2.2	1.5
STRIP-TESTER TENSION AT 20 GRAMS																
AVC	−5.7	−0.1	−3.8	0.0	−1.9	+1.3	−1.2	−0.9	−5.3	−2.2	−3.4	−4.2	−3.8	−3.7	−7.6	+0.2
BFTB	−4.5	0.0	−3.6	0.0	−2.3	+0.9	−1.5	−1.3	−4.5	−2.2	−4.8	−4.7	−3.6	−5.0	−7.2	+0.5
GHI	—	—	−3.5	+0.3	−1.9	−0.1	−1.1	−1.0	−4.0	−1.9	−2.1	−3.9	−1.6	−3.3	−7.4	+1.3
JCP	−5.3	+0.2	−3.5	+0.3	−2.0	+1.4	−1.3	−1.3	−4.4	−2.1	−4.5	−4.7	−3.0	−3.2	−7.1	+0.7
Average	−5.2	0.0	−3.6	+1.5	−2.0	+0.9	−1.0	−1.1	−4.6	−2.1	−3.7	−4.4	−3.0	−3.8	−7.3	+0.7
Diff Between Extremes	1.2	0.3	0.3	0.3	0.4	1.5	0.4	0.4	1.3	0.3	2.7	0.8	2.2	1.7	0.5	1.1
COMMERCIAL LAUNDERING—NOT SHAPED BEFORE PRESSING																
1 Time	−2.7	−0.9	−1.4	+1.2	−2.3	−1.6	−1.7	−2.6	−2.8	−0.7	−3.5	−4.2	−0.7	+1.4	−6.4	−2.8
2 Times	−3.4	−1.0	−1.4	+1.7	−3.0	−2.1	−2.6	−2.4	−3.3	−0.7	−3.5	−3.6	−1.4	+0.9	−6.4	−2.2
5 Times	−4.9	−1.4	−2.3	+1.6	−4.7	−3.1	−3.5	−2.8	−3.8	−0.9	−4.0	−4.2	−1.6	+0.9	−7.6	−3.8
COMMERCIAL LAUNDERING—RESHAPED BEFORE PRESSING																
1 Time	−2.4	0.0	−1.4	+2.1	−2.1	−0.3	−2.1	0.0	−2.8	0.0	−3.1	−2.1	−0.7	+2.8	−2.8	+2.1
2 Times	−3.1	−0.7	−2.4	+2.8	−3.1	−0.7	−2.1	−1.4	−3.1	−0.3	−4.2	−2.8	−0.7	+2.4	−2.8	+0.7
3 Times	−4.2	−0.7	−2.4	+2.1	−4.2	−1.7	−3.5	−2.1	−3.5	0.0	−3.1	−2.1	0.0	+2.1	−3.1	+0.7
4 Times	−4.2	−0.7	−2.1	+1.7	−4.5	−1.0	−3.5	−1.4	−3.1	+0.3	−3.8	−2.4	−0.7	+2.1	−5.2	−3.1
5 Times	−3.8	−0.7	−1.7	+1.7	−4.2	−0.3	−3.8	0.0	−3.5	0.0	−4.2	−2.8	−0.7	+2.8	−4.2	−3.5

TABLE XI

AVERAGES OF LABORATORY TESTS AND RESULTS AFTER DIFFERENT TYPES OF LAUNDERING

	Fabric No. 1		Fabric No. 2		Fabric No. 3		Fabric No. 4		Fabric No. 5		Fabric No. 6		Fabric No. 7		Fabric No. 8	
	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling
AATCC Standard Test 14-33	−3.4	−0.9	−1.7	+1.2	−4.0	−1.8	−2.5	−2.3	−3.1	−0.8	−3.5	−3.7	−1.8	−0.4	−8.1	−4.4
Strip-Tester at 40 Grams Tension	−4.2	+0.2	−2.0	+0.9	−1.5	+1.5	−0.9	+1.2	−2.4	−0.9	−0.6	−2.1	−0.5	−1.9	−3.7	+2.0
Strip-Tester at 30 Grams Tension	−4.4	−0.3	−2.7	−0.5	−1.7	+1.3	−1.0	+0.4	−3.4	−1.4	−2.2	−3.1	−1.8	−2.3	−5.1	+1.7
Strip-Tester at 20 Grams Tension	−5.2	0.0	−3.6	+1.5	−2.0	+0.9	−1.0	−1.1	−4.6	−2.1	−3.7	−4.4	−3.0	−3.8	−7.3	+0.7
5 Commercial Launderings—95°F Not reshaped	−4.9	−1.4	−2.3	+1.6	−4.7	−3.1	−3.5	−2.8	−3.8	−0.9	−4.0	−4.2	−1.6	+0.9	−7.6	−3.8
5 Commercial Launderings—95°F Reshaped	−3.8	−0.7	−1.7	+1.7	−4.2	−0.3	−3.8	0.0	−3.5	0.0	−4.2	−2.8	−0.7	+2.8	−4.2	−3.5
Home Washer—105°F Hand-Ironed	—	—	+1.4	+1.2	−1.5	−1.2	−0.9	−0.5	−0.9	+0.3	−0.2	−3.9	+0.9	−2.5	−3.9	+2.3
Home Washer—140°F Hand-Ironed	—	—	+1.4	+0.6	−2.3	−1.6	−1.3	−0.1	−1.0	+0.2	−1.2	−3.4	+1.2	−2.7	−4.5	+1.9
Home Washer—95°F Flat-Bed Pressed	−1.1	−0.4	−1.0	+1.1	−1.9	−1.3	−1.8	−2.1	−2.3	−0.9	−3.3	−3.9	−2.8	+0.6	−8.0	−2.3
Home Washer—100°F Restored on Tension Presser	−2.3	−0.5	−1.0	+1.5	−2.0	−0.8	−2.0	−0.3	−2.5	−0.5	−1.5	−0.8	−1.3	+0.3	−3.0	0.0

it must be observed that no method of testing employed at the present time can predict with any degree of accuracy what will happen to rayon merchandise in consumer use, when subjected to home or commercial laundering. It should also be noted that, although the results of the standard test method come closer in most cases to results found after five commercial launderings, each standard average that is used for comparison in this survey is compiled from figures from four different laboratories, and that each laboratory result listed has again been computed on six individual measurements. In other words, in order to make even a nominally accurate prediction in this respect, it appears necessary to make at least eight standard tests distributed among four laboratories, which in any large-scale certification program would be economically impossible. On the other hand, if only one or two tests are used it can readily be seen how the chances are about equal for approving both inferior and serviceable merchandise as being acceptable under an identification program at, let us say, 2 per cen: shrinkage.

Another point that is brought out, and one that prompts further research into the possibilities of the Strip-Tester is a comparison of the maximum deviation between extremes of interlaboratory results on the Strip-Tester as compared with interlaboratory results according to standard test procedure. Of the 48 comparisons that are tabulated (each based on an average reported by four different laboratories) the "Strip-Tester" shows only eleven, as compared with thirty-seven, greater extremes recorded by the AATCC test (as indicated in Tables VIII, IX & X). These figures are even more impressive when examined in terms of percentage of difference between extremes of results reported. Of the forty-eight comparisons made the extreme deviations break down as shown in Table XII.

TABLE XII

COMPARISON OF EXTREME DEVIATION OF AVERAGES OF ALL LABORATORY TESTS

AATCC 14-33	Extreme Deviation	Strip-Tester
0	5.5% or Greater	0
1	5.0% or Greater	0
3	4.5% or Greater	0
3	4.0% or Greater	0
5	3.5% or Greater	0
6	3.0% or Greater	0
9	2.5% or Greater	1
13	2.0% or Greater	4
23	1.5% or Greater	12
40	1.0% or Greater	19
46	0.5% or Greater	30
2	Less than 0.5%	18

An interesting question that is presented for serious consideration upon the completion of this project is whether or not it will ever be possible to predict accurately that a specific article made of a specific rayon fabric will not shrink beyond a certain specified percentage. In order to be dependable, that precentage figure would have to be set so high that no consumer would purchase the merchandise.

In view of the facts brought out by this study it appears virtually impossible to correlate test results with consumer practices. In spite of the fact that the Strip-Tester has demonstrated a high degree of reproducibility of results, the great number of variables that are encountered in the different ways in which a garment may be handled by each individual consumer (despite washing instructions) preclude accurate laboratory predictability of performance in use.

In conclusion it is suggested that thought be given to the establishment of some new standard for informing the consumer of the shrinkage potential of a fabric, based not on what she (with a certain amount of good fortune) may hope to expect, but based on what has actually happened under controlled conditions with some such accurate measuring instrument as the Strip-Tester.

Rhode Island Section Meeting Report

Johnson's Grille, Providence, R I
February 23, 1951

THE Rhode Island Section met at Johnson's Grille, Providence, on Friday evening, February 23, 1951, with 175 attending. Speakers for the evening were Herbert C Haller, assistant director of research, Forstmann Woolen Company and Manuel Silva, superintendent of finishing, Hayward-Schuster Mills. Mr Haller spoke on "Wool Felting and Its Behavior in the Fulling Mill"; Mr Silva's topic was "Face-Finished Woolens."

Respectfully submitted,
ROBERT G THOMAS,
Secretary

—♦ ♦—

JOHN A HARLEY, Chairman of the 1951 Outing of the Rhode Island Section, has announced the following committees for the event, to be held June 22 at the Wannamoisett Country Club:

Golf:—James Davies—Arnold Hoffman Co; Henry E Stanley, Jr—Ciba Co, Inc.

Photography:—Kenneth Everett—Powdrell & Alexander Co.

Donations and Tickets:—A Newton Graves—Franklin Process Co.

Parking and Reception:—Harrison Gorton—American Aniline Products, Inc; John Rourke—Lincoln Bleachery & Dye Works.

Printing: — R G Thomas — Rohm & Haas Co.

Dinner: — Herbert Travis — Rohm & Haas Co; Elliott Plummer—Cook Yarn Dye Mills, Inc.

Prizes: — Fred Grant — Synthron, Inc; Charles Stokes—Carbic Color & Chemical Co; Mathew Quigley — Interchemical Corp; Alfred Lombard—Geigy Co.

Publicity: — John Wilson — General Dyestuff Corp.

Cotton Group——

CONTROL OF THE CAUSTIC-SILICATE RATIO IN PEROXIDE BLEACHING LIQUORS*

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Lincoln Bleachery and Dye Works Division
Lonsdale Company, Lonsdale, R I

INTRODUCTION

THE development of continuous peroxide-bleaching systems has been one of the most outstanding advances in the field of textile finishing in the last ten years. Descriptions of the process and the machinery required have been published in several articles *(1-7)*.

The bleaching operation is usually carried out in two stages. The first step involves saturating the fabric with dilute caustic soda, heating it to approximately 212°F for about an hour, and then washing out unused caustic and solubilized impurities. In the second step, fabric is saturated with a dilute alkaline solution of hydrogen peroxide, heated to 212°F for an hour, and then washed to remove residual chemicals. Large stainless-steel J boxes provide for the high-temperature storage of the fabric in a continuous operation.

These continuous bleaching ranges can be equipped with a wide variety of modern instruments for controlling pressures, temperatures, steam flows, and liquid levels *(8-10)*. However, it is necessary to check the concentrations of the saturating liquors by periodic titrations.

The caustic saturator employed in the first stage of the operation is fed with strong caustic soda, such as 50% liquid, by means of a variable-feed pump or by gravity through a flowmeter. Periodic titrations with acid permit the operator to maintain the desired concentration in the saturator. It is necessary to determine the correlation between the caustic concentration in the saturator and on the fabric for each different type of fabric processed.

The peroxide saturator normally contains three components: namely, hydrogen peroxide, sodium silicate, and caustic soda. In this case also, the chemicals can be fed by means of proportioning pumps or from elevated storage tanks through flowmeters. Control of the saturating solution is maintained by titrating for peroxide with permanganate and for total alkalinity with acid. When a variety of different fabric constructions and weights is being processed, it may be found that some fabrics contain residual caustic from the first stage of treatment. As this caustic soda enters the peroxide saturator by way of the cloth, it changes the bath composition. Although the total alkalinity of the saturator liquor increases, it becomes very difficult to adjust the feed rates to maintain the desired ratio between the sodium silicate and caustic soda since both chemicals contribute to the total alkalinity.

The ratio of caustic to silicate in the peroxide saturator is rather critical. Insufficient caustic soda seems to promote deposits of silica or some type of silicate in the J box. This condition is undesirable since the cloth does not slide easily through the J box and may even incur rubmarks or holes. On the other hand, excess caustic soda accelerates the decomposition of the peroxide, which usually causes poor bleaching.

It was possible to develop a rapid volumetric method for determining the caustic-silicate ratio in the peroxide saturator. By suitable modification of a published procedure for volumetric silica determination *(11)* a technique was devised which was found to be sufficiently simple, rapid, and accurate for use as a plant control method. The volumetric procedure for determining silica is based on the fact that hydrous silica reacts with sodium fluoride to form a fluosilicate as in the following equation:

$$SiO_2 + 6NaF + 2H_2O = Na_2SiF_6 + 4NaOH$$

The mixture of caustic and silicate is first titrated with acid in the presence of methyl-red indicator, sodium fluoride is added, and a second titration is made to the methyl-red endpoint. Several aspects of this procedure were investigated in the course of developing a plant control method.

G M Gantz

In continuous peroxide-bleaching ranges used for cotton fabrics, the Na_2O-SiO_2 ratio in the peroxide saturating liquor is rather critical. Insufficient caustic soda will promote deposition of silica in the equipment, whereas excess caustic accelerates the decomposition of peroxide and results in poor bleaching. For the most part, adequate control of this ratio is maintained by use of proportioning pumps, flowmeters, and periodic titrations for total alkalinity. When a wide range of fabric styles and weights is being processed, some residual caustic may be left on the goods and enter the peroxide saturator. The total alkalinity will increase but it is no longer possible to control the caustic-silicate ratio.

A rapid volumetric procedure has been developed for determining the caustic-silicate ratio in the peroxide saturator. The method is based upon the formation of sodium fluosilicate from hydrous silica and sodium fluoride. Many ions, such as calcium, iron, and phosphate, interfere, but the procedure has proved useful in the plant. Calculations are simplified by use of a nomogram.

* Presented by Dr Gantz before Twenty-ninth Annual Convention in Portsmouth, N H, on Sept 29, 1950.

** Present address: American Cyanamid Co, Stamford, Conn.

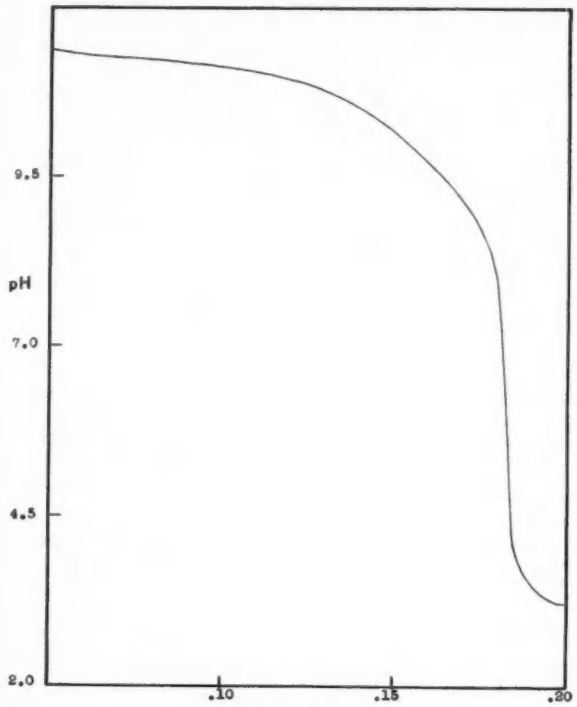

Figure 1

pH Curve of a Caustic Silicate Solution
0.097 g NaOH, 0.080 g Na_2SiO_3 in 200 ml H_2O

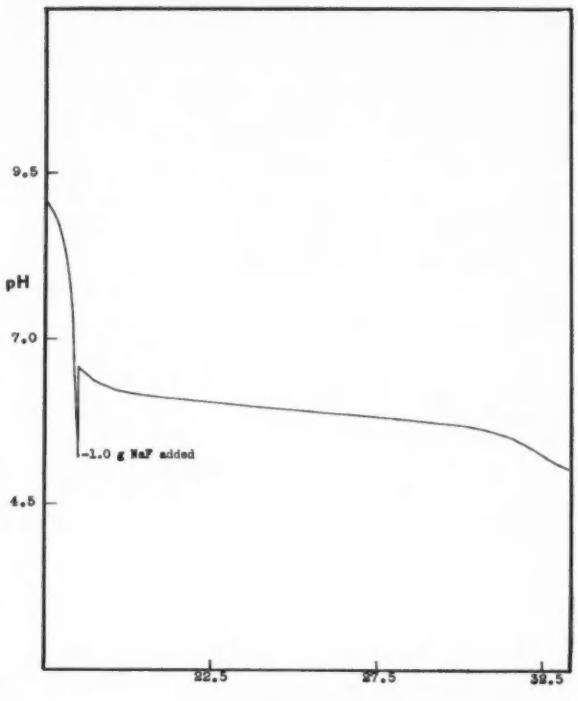

Figure 2

pH Curve of Caustic-Silicate Titration with NaF
0.097 g NaOH, 0.080 g Na_2SiO_3 in 200 ml H_2O

EXPERIMENTAL

A) SELECTION OF INDICATOR—It was realized very clearly in this work that methyl red is very unsatisfactory as an indicator for a volumetric silica titration. In our experiments the endpoint was not sharp, the color faded, and reproducible results were obtained only after long practice. The pH curve of a typical caustic-silicate titration with acid was then determined by means of a Beckman Model M pH meter. This curve, shown in Figure 1, should be compared with the curve in Figure 2, which illustrates a similar titration with the addition of sodium fluoride. As the pH change at the second endpoint was quite gradual, it is quite obvious that methyl red would not be a satisfactory indicator.

Several indicators were studied in an effort to find one better than methyl red. The results are shown in Table I. Many of the indicators had ranges too wide to be useful, while others changed color on either the acid or alkaline side of the desired endpoint. The last combination of indicators shown in Table I, two parts methyl red to one part methylene blue, was found to be most suitable. This combination gives a sharp color change at a pH very near the desired endpoint. The solution is prepared by dissolving 0.1 gram of methylene blue in 100 ml water and adding 0.2 gram of methyl red dissolved in 100 ml of ethyl alcohol. In the presence of methylene blue, the color change of methyl red is from green to purple.

B) EFFECT OF SODIUM FLUORIDE—A study was made of the effect of sodium fluoride on the titration from several aspects. It was found that the amount of sodium fluoride added to the titration solution caused the endpoint to shift. This is illustrated in Figure 3. Advantage may be taken of this fact in selecting an amount of fluoride so that the endpoint will occur at the optimum pH for the indicator. It was concluded that variations up to 10 per cent in weight of fluoride

TABLE I
COMPARISON OF INDICATORS FOR CAUSTIC-SILICATE TITRATIONS

Indicator	*Color Range*	*pH Range*	*Remarks*
Methyl violet	blue violet—violet	5.0-6.0	indistinct
Bromcresol purple	yellow—purple	5.2-6.8	indistinct
p-Nitrophenol	colorless—yellow	5.0-7.0	indistinct
Chlorphenol red	red—yellow	5.0-6.8	indistinct
Propyl red	red—yellow	4.7-6.6	indistinct
Methyl red	red—yellow	4.2-6.1	indistinct
1 Bromcresol purple 1 Methylene blue	grey—blue	5.9-6.2	too alkaline
4 Bromcresol purple 2 Methyl red 1 Methylene blue	grey—greenish grey	4.6-5.3	indistinct
5 Bromcresol purple 2 Methylene blue	grey—greenish grey	6.0-6.6	indistinct
1 Methyl red 1 Methylene blue	green—blue	4.8-5.2	sharp, acid
1 Methyl red 2 Methylene blue	green—blue	4.8-5.2	indistinct
2 Methyl red 1 Methylene blue	green—purple	5.1-5.4	sharp

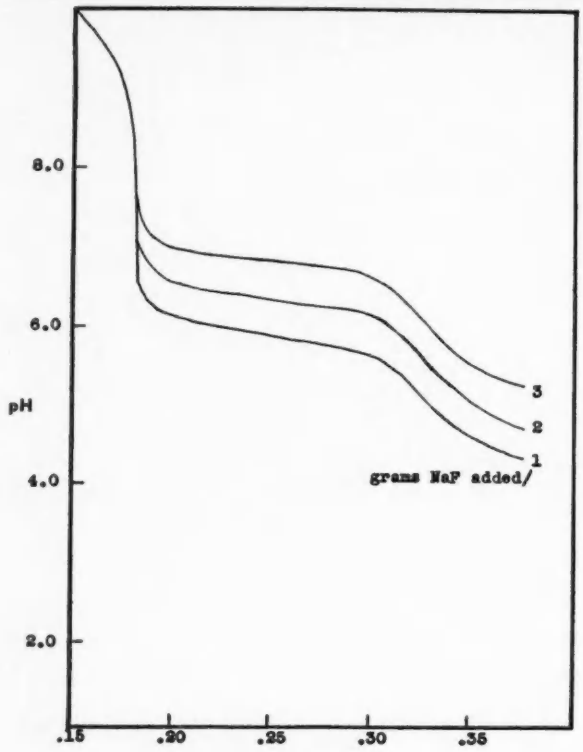

Figure 3

Effect of Fluoride Concentration
0.097 g NaOH, 0.080 g Na_2SiO_3 in 200 ml H_2O

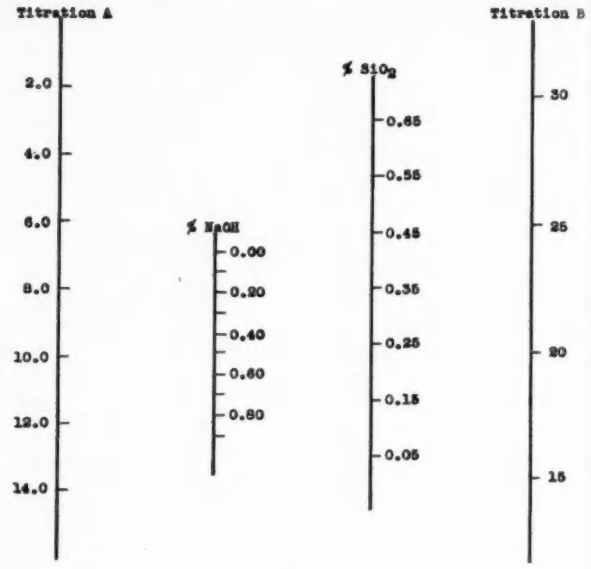

Figure 4

Nomograph for Calculation of Per Cent Caustic and SiO_2

added could be tolerated. This allowed use of calibrated scoops for measuring the fluoride in place of a balance or scales.

Since all sodium fluoride contains some alkalinity, each lot must be titrated and a suitable correction factor determined. The CP grade of sodium fluoride is expensive for routine use in the plant, but it does have a lower alkalinity than technical grades. Both light and dense forms of sodium fluoride are available, and, as would be expected, the two forms have different weights per scoop. The characteristics of four different types of sodium fluoride are shown in Table II. In the interest of economy and accuracy, the dense technical grade of sodium fluoride was selected as most suitable. It is apparent from the data in the table that the dense grades show lower variations in scoop weight than light grades. Undoubtedly the larger crystal size of the dense grade results in better packing and flowing qualities.

C) INTERFERENCE BY OTHER IONS —One of the disadvantages of the volumetric silica procedure is the fact that several ions interfere with the accuracy of the determination. A few of the possible contaminants or chemical agents that might be found in a peroxide bleaching liquor were investigated. The results are shown in Table III.

The presence of borate ion had the greatest effect on the accuracy of the titration. Fortunately, this ion is not usually found in peroxide bleaching solutions. Most of the phosphates cause interference in the reaction, but in concentrations as low as a 0.1 per cent they can be tolerated. Low concentrations of this order of magnitude are encountered when phosphates are used as water conditioners or sequestering agents.

Both calcium and iron cause interference with the reaction. These ions are very undesirable in peroxide solutions and must be avoided in continuous bleaching ranges. The titration should be carried out in distilled water to eliminate any error that might occur because of ions present in hard water.

The two penetrating agents investigated both had a definite effect upon the titration. Although low concentrations of the order of 0.1 per cent could be tolerated. it is suggested that all compounds of this type which might be used in peroxide bleaching liquors be checked for their effect on the accuracy of the titration.

D) PLANT CONTROL PROCEDURE —In devising a titration procedure suitable for use as a plant control method, we found it necessary to compromise between accuracy, speed, and simplicity. The procedure finally adopted is an extension of the regular alkalinity titration and requires about an additional minute

TABLE II
COMPARISON OF SODIUM FLUORIDE SAMPLES

Grade	Average values for 10 samples: ml N/5 acid	Wt per scoop	% deviation
B and A Light, CP	2.20	0.930	±4.85
B and A Dense, CP	1.80	1.221	±1.02
G C Co Dense, Tech	2.35	1.345	±0.96
G C Co Light, Tech	2.69	0.875	±5.01

TABLE III
EFFECT OF VARIOUS IONS IN CAUSTIC-SILICATE TITRATION

Contaminant	*% in soln*	*% Error for SiO_2*
Sodium sulfate	1.0	0.9
Sodium chloride	1.0	1.8
Sodium hydroxide	1.0	1.8
Tetrasodium pyrophosphate	1.0	23.0
	0.1	1.8
Sodium tripolyphosphate	1.0	17.7
	0.1	9.7
Quadrafos	1.0	4.4
	0.1	3.6
Calgon	1.0	18.6
	0.1	17.7
Sodium dihydrogen phosphate	1.0	5.3
Calcium chloride	1.0	8.9
	0.1	2.5
Ferrous sulfate	1.0	10.6
	0.1	7.1
Boric acid	1.0	175.0
	0.1	42.0
Triton 770	0.5	5.3
	0.1	0.9
Nacconol NR	1.0	15.9
	0.1	3.3

TABLE IV
ACCURACY OF CAUSTIC-SILICATE TITRATION PROCEDURE

Known Solution		*Found by Titration*			
		Calculated		*From Nomograph*	
NaOH	*SiO_2*	*NaOH*	*SiO_2*	*NaOH*	*SiO_2*
0.97	0.39	1.01	0.36	1.04	0.35
		0.98	0.39	1.00	0.38
		0.95	0.40	0.96	0.38
		1.03	0.36	1.05	0.35
		1.03	0.36	1.02	0.37
		0.95	0.40	0.95	0.39
	Average	0.99	0.38	1.00	0.37
0.73	0.39	0.77	0.36	0.77	0.35
0.49	0.39	0.51	0.38	0.54	0.38
0.49	0.39	0.54	0.36	0.55	0.36
0.49	0.30	0.57	0.25	0.58	0.25
0.49	0.20	0.54	0.17	0.55	0.17
0.24	0.39	0.28	0.38	0.28	0.38
0.24	0.39	0.27	0.37	0.27	0.37
0.24	0.39	0.27	0.38	0.27	0.37
0.24	0.20	0.29	0.17	0.30	0.17
0.21	1.03	0.18	1.03	0.18	1.00
		0.18	0.98	0.18	0.97
		0.18	0.97	0.19	0.98
		0.19	0.99	0.19	0.99
		0.20	0.99	0.20	0.99
		0.19	1.00	0.19	0.99
	Average	0.19	0.99	0.19	0.99

TABLE V
COMPARISON OF GRAVIMETRIC AND VOLUMETRIC ANALYSES OF PEROXIDE BLEACHING LIQUORS

Sample	*Volumetric*		*Gravimetric*	
	% SiO_2	*% NaOH*	*% SiO_2*	*% NaOH*
1	.33	..	.370	...
2	.30	.02	.317	.018
3	.26	.01	.256	.011
4	.39	.06	.345	.064

to perform. It is described below:

Add a 10-ml sample of the peroxide solution to be analyzed to a 250-ml Erlenmeyer flask containing 100 ml of distilled water. Add 5 drops of methyl red-methylene blue indicator and titrate with N/5 sulfuric acid until the solution just turns purple. Record buret reading as titration A. Add a calibrated scoop of sodium fluoride (one gram) to the flask and swirl for one minute. Continue the titration until the purple endpoint is reached again and record the buret reading as titration B (total acid used for both steps). The per cent silicate and caustic may be calculated from these two values or read off on a nomogram.

In the calculation of the percentages of caustic and silica it is necessary to know the correction for alkalinity of the sodium fluoride, the ratio of sodium oxide to silica in the silicate used, and the exact normality of the standard acid. The equations are as follows:

$$\% \text{ NaOH} = \frac{(A - X) \times N \times 0.040}{10} \times 100$$

and

$$\% \text{ SiO}_2 = \frac{B - (A + C) \times N \times 0.060}{4 \times 10} \times 100$$

and

$$X = \frac{B - (A + C) \times 60 \times D}{4 \times 31}, \text{ where}$$

A = ml titration A
B = ml titration B
C = ml correction for fluoride
D = ratio Na_2O/SiO_2 in silicate used
N = normality of standard acid

In any series of analyses, C, D, and N are constants and the above equations are greatly simplified. It will be noted that these equations differentiate between NaOH added to the bleaching solution and the alkalinity due to sodium silicate. By use of a standard grade of silicate, a standard fluoride, and an acid always standardized to the same normality, it is possible to construct a nomogram for use with the two titration values and to eliminate all calculations. A typical nomogram is shown in Figure 4. For use in the plant it is more convenient to expand the nomogram over the actual operating range and to convert per cent SiO_2 into per cent sodium silicate.

The simplified titration procedure already described was tested for accuracy and precision by preparing solutions containing known amounts of sodium hydroxide and sodium silicate. The percentages of caustic and silica found in these known solutions by calculation and by use of the nomogram are shown in Table IV. The values obtained by calculation and those obtained from the nomogram agreed fairly well. The accuracy of the procedure is not high, but it is believed to be sufficient for use as a control procedure. Table V shows a few comparisons between this volumetric method and the regular gravimetric silica analysis. Since these determinations were made over a period of time on bleaching liquors used in the plant, is was concluded that there were no adverse factors which had not been taken into account.

There are some precautions that should be taken in carrying out this procedure. The sharp color change of the indicator occurs over a narrow pH range, and care must be taken not to pass the endpoint during the first titration. The presence of peroxide in the solutions promotes fading of the color, and the second titration must be completed quickly. It is important to

use equal amounts of indicator for each analysis and it is helpful to keep a comparison solution of the correct color shade. These errors are minimized by experience. It may be noted that over the past three years this titration has been carried out satisfactorily by several different machine operators.

SUMMARY

The ratio of caustic soda to sodium silicate in the peroxide solutions used in modern continuous bleaching ranges has been found to be critical. A volumetric procedure for determining this ratio in peroxide bleaching liquors has been developed, which is suitable for use as a plant control method. The determination is based on the reaction of sodium fluoride with hydrous silica. A combination of methyl red and methylene blue was found to have a sharp color change at the desired pH for this reaction. Both the amount and type of sodium fluoride used have an effect upon the reaction. A dense technical grade was selected as most suitable.

Borates, phosphates, calcium, and iron interfere with the accuracy of the titration. In plant practice, borates are not encountered, phosphates are used only in tolerable amounts as sequestering agents, and both calcium and iron must be avoided for other reasons in peroxide bleaching solutions.

By standardization of the silicate, fluoride, and acid used in the titration, it is possible to construct a nomogram which gives per cent caustic and silicate without any need for calculations. The procedure is not highly accurate, but it has been found quite useful as a plant control procedure over a period of years.

REFERENCES

(1) Kauffmann, H O, U S Patents 2,107,297; 2,220,682; 2,231,426; 2,257,716.

(2) Poesl, C N, U S Patent 2,304,474.

(3) Butterworth, DeHaven, *Textile World* 94, No. 1, 76 (1944).

(4) Campbell, D J, *Am Dyestuff Reptr* 33, 293 (1944).

(5) "The Technical Staff" *Am Dyestuff Reptr* 33, 345, 365, 385, 405 (1944).

(6) Mills, R, *Am Dyestuff Reptr* 35, 388 (1946).

(7) Moore, J L, *Am Dyestuff Reptr* 38, 497 (1949).

(8) Murphy, E A, and Pollock, R, *Instrumentation* 2, No 4, 22 (1947).

(9) Bowden, C W, *Am Dyestuff Reptr* 37, 647 (1947).

(10) Bowden, C W, *Textile World* 99, No 2, 124 (1949).

(11) *Silicate P's and Q's*, Philadelphia Quartz Co, 15, No 8 (1935).

DISCUSSION

Question: What is the effect of Versene or Nullapon and other sequestering agents on the titration?

Answer: Presumably in the amounts commonly necessary for softening water, sequestrants do not effect titration values. The effect of larger concentrations should be checked by experiment.

Q: Silica deposits in bleaching are usually attributed to an insufficiency of caustic soda. We have found in our laboratory, however, that silica residues on materials always contain calcium and magnesium. By maintenance of calcium and magnesium permanently in solution, deposition of silica was prevented.

A: Thank you.

CALENDAR

COUNCIL

April 20 (Raleigh, N. C.), June 15 (Hotel New Yorker, New York), October 18 (Hotel Statler, New York), November 16 (Hotel New Yorker, New York).

GENERAL RESEARCH COMMITTEE

April 20 (Raleigh, N. C.), June 15 (Hotel New Yorker, New York), October 18 (Hotel Statler, New York), November 16 (Hotel New Yorker, New York).

NATIONAL CONVENTIONS

1951: October 17-18-19, Statler, New York
1952: Nov. 6-8, Boston.
1953: September 17-19, Hotel Stevens, Chicago.

HUDSON-MOHAWK SECTION

Meetings: May 11 (Albany), June 22 (Annual Outing).

MIDWEST SECTION

Meetings: May 5 (Hotel Schroeder, Milwaukee), June 16 (Outing, Lake Lawn Lodge, Delavan, Wis.), September 29 (Morrison Hotel, Chicago).

NEW YORK SECTION

Meetings: May 4 (Swiss Chalet), June 15 (Outing).

NORTHERN NEW ENGLAND SECTION

Meetings: April 13 (L T I, Lowell), May 18 (Andover C C, Andover), October 26 (L T I, Lowell), November 30 (Boston, Annual Meeting).

Outing: June 8 (Merrimac V C C, Methuen).

PHILADELPHIA SECTION

Meetings: April 13, September 14, October 26, December 7, January 18, 1952 (all at Kugler's Restaurant, Philadelphia).

Outing: June 1 (Torresdale-Frankford Country Club).

PIEDMONT SECTION

Meetings: April 21 (Raleigh, N C), June 29-30 (Summer Outing, Myrtle Beach, S C), September 22 (Annual Meeting, Charlotte, N C).

RHODE ISLAND SECTION

Meetings: April 27 (Wannamoisett Country Club), May 25 (Johnson's Grill), October 26 (Providence Engineering Society), November 16 (Johnson's Grill).

Outing: June 22 (Wannamoisett Country Club)

SOUTH CENTRAL SECTION

Meetings: May 12, December 1 (both in Hotel Patten). Summer Outing: August 24-25.

SOUTHEASTERN SECTION

Meetings: May 5 (Atlanta, Ga.), June 8-9 (Annual Outing, Radium Springs, Albany, Ga.), September 8 (Columbus, Ga.), December 8 (La Grange, Ga.).

WESTERN NEW ENGLAND SECTION

Meetings: May 4, June 22 (Outing).

OTHER EVENTS

AMERICAN ASSOCIATION OF TEXTILE TECHNOLOGISTS

Meetings: April 4, May 2, June 6, September 12, October 3, November 7, December 5 (Builders Club, New York).

AMERICAN CHEMICAL SOCIETY

Meetings: April 1-5 (Boston, Mass); April 8-12 (Cleveland, Ohio); September 3-7 (New York, N Y).

AMERICAN SOCIETY FOR TESTING MATERIALS

Annual Meeting, June 18-22, Atlantic City, N. J.

Spring Meeting and Committee Week, March 3-7, 1952, Cleveland, Ohio.

Annual Meeting, June 23-27, 1952, New York, N. Y. (The biennial Apparatus and Photographic Exhibits will be held in conjunction with this meeting).

NATIONAL ASSOCIATION OF TEXTILE MACHINERY MANUFACTURERS

Exhibit of American Textile Machinery, April 26-May 1, 1954, Atlantic City Exhibition Hall, Atlantic City, N. J.

NATIONAL OUTERWEAR AND HOSIERY ASSOCIATION

Knitting Arts Exposition, April 30-May 4, Atlantic City Auditorium.

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES

Luncheon Meetings—Hotel Commodore (April 11, May 9, September 12, October 10, November 14).

Spring Outing—The Greenbrier, White Sulphur Springs, W Va (June 14-16).

Annual Meeting and Dinner—Hotel Commodore (December 11).

TEXTILE RESEARCH INSTITUTE

Annual Meeting, Nov. 8-9.

Synthetics Group——

THE FINISHER'S POSITION REGARDING NEW SYNTHETIC FABRICS*

FRANCIS S RICHARDSON
Waldrich Company, Delawanna, N J

Francis S Richardson

A brief review of the dyers', printers', and finishers' position in regard to the natural fibers before the invention and development of man-made fibers. The part played during the past years by the regenerated cellulosic group, their present position and possible future.

The introduction of the true synthetics and their course of development. A discussion of the mechanical and chemical problems engendered by these various fibers with regard to some of the many factors involved in the finishing operations.

The possibility of further additions to the synthetic group with comments concerning the finishers' needs, attitudes, and responsibilities.

IN the days before the manufacture of regenerated or synthetic fibers, the finishers were divided on well-defined lines. A bleachery processed cottons, the silk dyer handled nothing but silk, and the woolen and worsted plants dealt with but one fiber. Outside of the normal production problems, these mills had to deal with two important variables common to the finisher of today. These were technological changes in methods and in equipment.

Before the days of synthetic fibers, new dyestuffs were being constantly introduced, new methods of handling existing colors were developed, and, as the chemical picture changed, machinery changed in some degree with it. Another factor that influenced the finisher of years ago as it does today was the end use for which a fabric was intended. A recent issue of a well-known textile journal highlighted the contrast of the years by running excerpts from a 1900 edition of their paper alongside a pictorial commentary on the Textile Machinery Show in Atlantic City. The changes of processing and equipment have been many and important, although the basic fundamentals in many cases have remained the same. The laws of chemistry and physics are, of course, no different in textile processing than in any other industry. Time, temperature and concentration produce definite results and require an entire instrument industry to control them. Good engineering has always gone a long way toward producing good results both years ago and today. There is no doubt that the problem of the woolen, silk, and cotton processors of those times taxed their ingenuity, resourcefulness and patience to the same degree as the problems today tax the present operators of finishing plants.

There is, however, an added factor today that did not exist years ago, and that is the synthetic fiber. With the introduction of the first man-made fiber, a change in the finishing picture was started that is still going on. The then-existing plants attempted to process the new fibers to the best of their ability on the equipment they already had in their factories. Some of these early trials were successful enough to point the way to the proper handling of the new yarns. Improvement in yarns and fabrics advanced with subsequent improvement in dyeing and finishing results. Generally speaking, the best work on early viscose and acetate was done by the silk finishers. Credit should go to the individuals in that branch of the industry for working out satisfactory methods of handling many synthetic fabrics. The changes have continued till today in the finishing mills. Cotton bleacheries and print plants now handle their share of synthetics; the silk-dyeing plant in some instances is such in name only, and the woolen mills have turned to running blends of one kind or another. The variables in methods and equipment continue, and a new generation of dyers, finishers, colorists and chemists has grown up with many new tools to work with in the form of dyestuffs and chemicals, as well as equipment.

The position of the regenerated fiber has been well established. Growing pains of a new industry were experienced and many new units of yarn manufacturing were started, some of which have weathered the storms and are our large suppliers of today.

Much thought and effort has gone into perfecting yarns, both filament and staple. Dyeability has long been the constant concern of all manufacturers, and the good quality of resulting piece-goods dyeing has proven the merits of their vigilance. The use of existing dyes was early explored in connection with dyeing the new fibers, and the story of the development of the acetate colors is one all are familiar with. Construction of fabrics made of regenerated fibers called for ingenuity and resourcefulness. The technologists' best efforts often came to grief, when his pieces were processed, because of a lack of knowledge on the part of both the finisher and himself. The trial-and-error development, however, went on, as did a generation of mutual education.

One of the most important and significant developments in the entire history of regenerated fibers has undoubtedly been the use of resinous materials as finishing agents. Some of these were known before the advent of new fibers, others have been developed since. In either case they have made it possible for technicians to produce fabrics that the finisher could manipulate to produce a final finished piece of merchandise possessing properties that could not be obtained in any other way. The finisher starting with the raw cloth can build color, resilience, abrasion resistance, stability to change of shape either in use or in cleansing, water repellency, appearance, and handle into the fabric to a degree that it is truly wonderful. Resins have enabled finishers to produce fabrics that have created a new branch of the clothing industry beyond

* Presented at the Twenty-ninth Annual Convention in Portsmouth, N H, on September 30, 1950.

anything ever dreamed of years ago. The slack and slack-suit yardages are enormous, and, to a large extent, this part of our business and our wearing apparel must be considered as new and as an addition.

This development is not an inroad into a field occupied by the natural fibers; it is new and it stands on its own feet. Entire plants are today engaged in the processing of fabrics that are used in the garment industry. Obviously, the development of the slack business has brought about many changes in the closely related suiting industry. The summer suit made of synthetic yarns is familiar to all of us, and is something that is here to stay. Beyond this, many women's suits for all-year-around use are, of course, made of synthetic fibers, and men's regular suits of medium weight are on the market. It has been remarked that, given a few more years and sufficient poundage of one or more of the new synthetic fibers, cloths of every weight in the men's suiting field will be produced and, of equal importance, will be of good quality.

A newer, and possibly as notable, a change of this kind has been the recent introduction of all-synthetic sidewall fabric in automobiles. For many years these cloths were made with cotton warps and wool fillings, and the manufacturers of these fabrics kept their mills running from season to season making the necessary style and color changes as required by the automotive industry. Certain requirements as to light fastness, abrasion resistance, and leaching govern the construction of these goods and kept the quality at a quite consistent level. Today one of the larger manufacturers of automobiles is turning out one of their medium-priced cars with the sidewalls made entirely of synthetic fabric. The economic difference is considerable, and every automobile manufacturer in the country is taking a good look at this newcomer in this field. Several others have been experimenting with this item and, undoubtedly, one or two more cars will shortly be using this type of fabric. There are many other fields where fabrics made of regenerated cellulose have attained a secure position.

The term synthetic has been rather loosely used when applied to the regenerated types. These regenerated yarns are natural cellulose that has been subjected to chemical and physical treatment for alteration of form and for change in some properties. This compares with changing iron ore to wire. The truly synthetic fibers, of course, are nylon, Orlon, dynel, the vinyl types and others which have actually been compounded. The yarns and fabrics made from these fibers have once more brought about changes in the processing industry. The use of nylon as a substitute for silk in the manufacture of parachutes was the factor which moved that fiber out of a groove of slow development into one of very rapid development. Undoubtedly, the manufacturer would have preferred to have moved at a slower and more cautious rate. It would seem, however, as we look back, that the need which hastened the rapid expansion and use of the fiber brought many of the problems to the fore quickly and brought acceptance and use that might not have been possible at a slower rate of development.

The need for stabilization of this fiber was recognized early, and the heat-setting machines of today are the answer to this need. The term "heat setting" of nylon has been generally used to describe this process. This term should be clarified to some extent. Nylon in the finishing mill is subjected to temperatures ranging from the temperature of the mill water supply on a winter's day up to 460° F. What point in this range is the end point below which it is not set and above which it is? Goods that have been steamed under pressure but never subjected to high temperatures have been very well stabilized and must be taken into consideration when the question of setting is involved. The apparently accepted practice is to suppose that, when heat setting by dry heat is being discussed, temperatures exceeding 400° F are implied. Good stabilization below this figure is of course possible, and many yards of nylon are never subjected to anything higher than 340° to 350° F. A much better understanding of end-use requirements and mill processing would be brought about if the term "temperature of stabilization" were used instead of the indefinite term, "heat setting," which in some instances neither the customer nor the mill man understands.

Nylon will find its level in all end uses as other fibers have. Poor styling and improper construction have produced some misfits, and undoubtedly there will be more.

The very extensive use of vinyl fiber in the seat-cover business has been an important factor in this trade. Very large yardages of mosquito netting made of vinyl monofilament yarn have been produced, and much more of this material will be used.

The introduction of Vinyon N with its higher heat-resistant properties has increased the use of this fiber. Several fields for different fabrics have been opened up, and exploratory work is being done which would greatly increase the demand along other lines.

The approaching large-scale production of Orlon will present the processors of synthetic fabrics with a new set of problems. Many of them have already run experimental yardages and are at least partially familiar with some of its properties. Undoubtedly, the major use of the fiber will be for industrial uses. The lack of suitable coloring materials that can be applied easily with existing equipment will restrict its use as a dyed or printed item in the apparel or house-furnishing field. A modification of the present filament and the advent of staple Orlon would alter this picture considerably.

The finisher of today who handles regenerated and synthetic fabrics has a large responsibility. The huge investment in research, manufacturing, and production which has preceded his receiving the woven fabric is enormous, and the success or failure of many efforts may rest on his ability to process a given fabric properly. He needs all the technical assistance he can get from all sides; he should be equally as ready to receive assistance when it is offered as he is to receive it when he asks for help. On the other hand, manufacturers and suppliers should gauge their advertising claims with the finisher's position in mind. Sweeping claims may arouse interest and stimulate activity, but may cause a processor a great deal of trouble and in the long run defeat the initial purpose. The average finisher attempts conscientiously to carry out a quality job. He will do a better one with co-operation within his group and among his suppliers. The most important factor of all, if the finisher is to do his best is that his customer pay a quality price for a quality job.

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NNE Section to Meet in Lowell on April 13

THE Northern New England Section will meet at the Lowell Textile Institute, Lowell, Mass, on April 13 to view an exhibit of temperature measurement and heating. The exhibit, of which Leonard Gilman will be in charge, will be opened at 5:30 pm, prior to the regular dinner and technical session.

Following dinner which is scheduled for the technical session will be held in the Eames Hall Lounge and will consist of three talks by Lowell Textile graduate students as follows:

"Comparison of Complex Phosphates in Kier Boiling"—Edward Cherowbrier.

"Use of the Spectrophotometer in Evaluating Dyestuff Penetration"—Robert W Sumers.

"Radio-active Tracer Techniques as Applied to Textiles"—Joan Gregg and Nathaniel A Matlin.

Philadelphia Section——

THE ELECTRICAL RESISTANCE OF TEXTILE MATERIALS*

MASON HAYEK and F C CHROMEY

Contribution No 100 from Jackson Laboratory
E I du Pont de Nemours & Co, Inc
Wilmington, Delaware

An instrument is described which has been developed for the measurement of the electrical resistance of fibers, fabrics, films and other materials. The instrument is useful over the range 1 x 10^5 to 400,000 x 10^9 ohms. Measurements on textile materials permit an evaluation of the tendencies of those materials to accumulate and hold electrostatic charges. Examples of test results are given.

INTRODUCTION

IN a previous publication *(1)* an instrument was described that had been built in this laboratory for the measurement of static electricity on fabrics. This report will describe a complementary instrument, which was subsequently developed for the measurement of the electrical resistances of textile materials.

The importance of investigations of static electricity on fibers and fabrics need not be re-emphasized here. It is sufficient to state that the problems resulting from the accumulation of static electrical charges on textile surfaces must be solved by the yarn and fabric manufacturers and by the textile-finish supplier. Such problems may also be important throughout the period of service of a fabric.

Of the two possible means of preventing the accumulation of a large electrostatic charge on a surface, namely, the prevention of the formation of a charge or the rapid dissipation of the charge, we shall limit ourselves to the second means. The charging process was described briefly in the previous paper. If the charge is to be dissipated as it is formed, the surface electrical resistance must be sufficiently low (or the conductivity sufficiently high) to cause the charge to be distributed over the surface or lost to the ground. The electrical resistances of fibers and fabrics vary widely with the nature of the fiber, and the problem of decreasing the high static propensities displayed by some fibers is a matter of decreasing the surface electrical resistances of those fibers by the use of suitable finishes.

* Presented by Dr Mason Hayek before the Philadelphia Section in Philadelphia on Friday, January 19, 1951.

THE MEASUREMENT OF ELECTRICAL RESISTANCE

In the use of the static tester, which was previously described *(1)*, a charge was developed on a test fabric, and a measure of the electrical resistance of the fabric was obtained by determining the

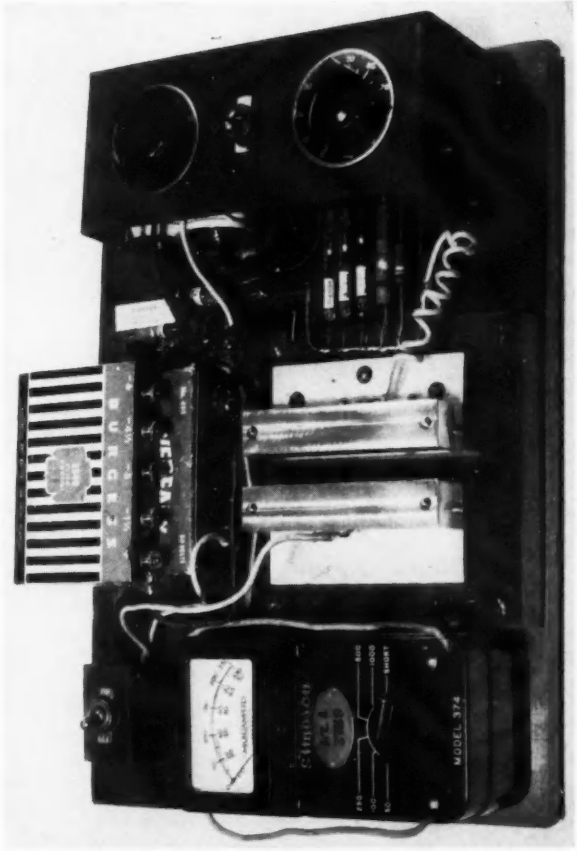

Figure 1

TABLE I
ELECTROSTATIC PROPERTIES OF VARIOUS FABRICS

Fabric	Relative Humidity (%)	Electrical Resistivity (Ohms x 10^6)	Static Test Data† Charge	Half-life Period, Sec
Cotton	25	25,000	62	2
Cotton	50	1,400	15	1
Wool	25	>950,000	170	300
Nylon	25	>950,000	135	500
Nylon	50	>950,000	165	300
Orlon*	25	500,000	150	300
Orlon +1.0% Agent "A"	25	340	18	1

* Trade-mark for du Pont acrylic fiber.

† Test fabrics charged by friction against untreated nylon.

rate of decay of the charge. If it is accepted that the static propensities of the fabrics should be reduced by reducing the surface electrical resistances of the fabrics, then it is reasonable to measure those resistances directly. The resistance tester described below was devised to be complementary to the static tester. If only the electrical resistance is to be determined, only the resistance tester need be used, but if a measure of the static behavior of a fabric in use is desired, the limiting resistances can be fixed by reference to tests with the static tester.

The resistance tester as it was constructed permits the measurement of resistances over the range of 1 x 10^6 to 400,000 x 10^6 ohms with an accuracy of better than five per cent over the greater part of that range. The instrument has been found to be of great value because of the ease of measurement, the reproducibility of results, and the ease of comparison of data. The device is illustrated in Figure 1. In use the instrument is generally housed in a constant-humidity box used interchangeably with the static tester. The circuit diagram for the resistance tester is shown in Figure 2. The principle involved is a measurement of the IR drop in a known resistance, where I is the current leaking through the sample. The voltage across the standard resistance is amplified with an electrometer tube, and the extent of unbalance of the circuit is measured with a microammeter. From a graph of the logarithm of the meter deflection against the logarithm of the test resistance in standard resistor units (Figure 3), the unknown resistance can be determined. The graph was drawn through two points obtained with a known resistance.

The electrodes beneath which the test specimen is mounted are two 18-8 stainless-steel bars, 3¾ inches long, ¾ inch wide and ½ inch high. The bottom surfaces were ground smooth. The electrodes are mounted 0.50 inch apart on polished Lucite acrylic-resin blocks of the length and width of the electrodes and with a thickness of ⅜ inch. These, in turn, are mounted on blocks of Teflon tetrafluoroethylene resin of the length of the electrodes, 1⅝ inches wide and 11/16 inch thick. The whole assembly is supported on a Bakelite base. Steel posts mounted in the Teflon pass through the Lucite and through holes in each of the electrodes. The latter fit snugly on these posts and are thus held in a fixed position, although they can be removed from the posts to permit test samples to be placed between the electrodes and Lucite. The posts are 3/16 inch in diameter, and the center-to-center distance is 3 5/16 inches. The mounting of the electrodes is such that the resistance over the parts of the assembly from one electrode to the other is very much greater than any resistance to be measured between the electrodes.

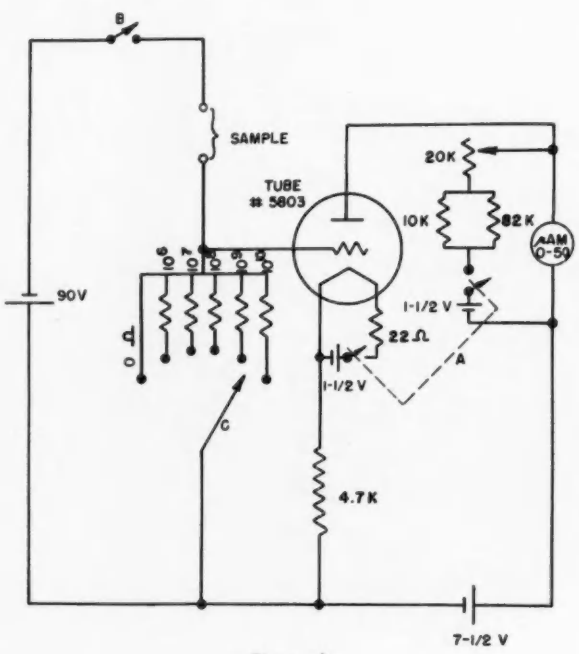

Figure 2

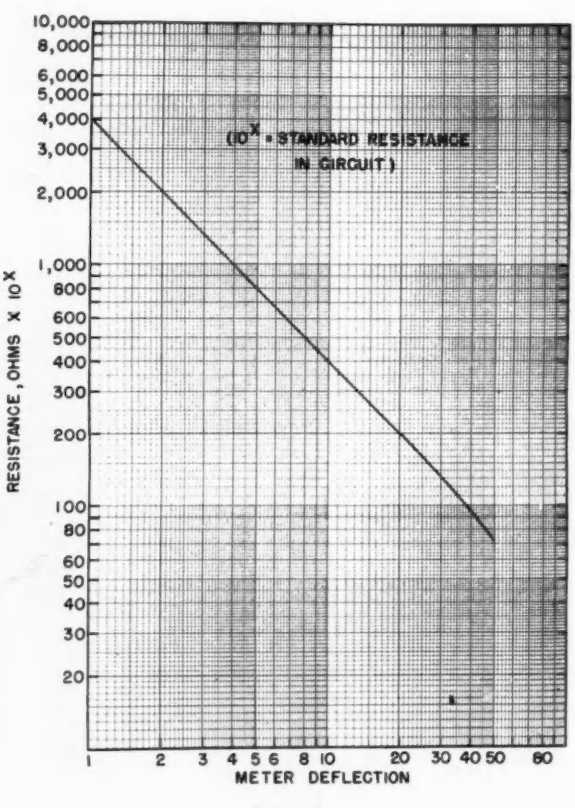

Figure 3

TABLE II
ELECTRICAL RESISTIVITIES OF NYLON FABRICS
AT 25% RELATIVE HUMIDITY

Fabric	*Resistivity, Ohms x 10^8*
Untreated nylon	>950,000
Nylon + 0.05% Agent A	71,000
Nylon + 0.2% Agent A	720
Nylon + 0.5% Agent A	160
Nylon + 0.05% Agent B	20,000
Nylon + 0.2% Agent B	2,600
Nylon + 0.5% Agent B	630

For a test, a sample is mounted beneath the electrodes, switch A (Figure 2) is turned on, the microammeter is adjusted to zero with the variable resistance, switch B is closed, and switch C is adjusted until a significant deflection is observed on the microammeter. This deflection and the position of switch C are noted, and the resistance of the test sample is obtained with the use of the graph shown in Figure 3.

Fabrics, fibers, films or materials of any other form which can be mounted between the electrodes to give good contact with the electrode faces can be tested. If the dimensions of the sample can be determined, the surface electrical resistivity can be obtained by multiplying the observed resistance by the ratio of the width of the sample to the distance between the electrodes. The unit of surface resistivity is an ohm.

An Aminco-Dunmore Electric Hygrometer Indicator, supplied by the American Instrument Company, Catalog No. 4-4900, is used to measure the relative humidity in the constant-humidity box containing the resistance tester. Because of the sensitivity of the resistance tester and the variation of electrical resistance of test specimens with humidity, the value of the data is dependent upon a knowledge of the correct relative humidity or upon a close control of the humidity. In the range of electrical resistances below 50,000 x 10^8 ohms, the reproducibility of a single resistance measurement is limited by the humidity control, rather than by the experimental error in the measurement itself. For resistances above 50,000 x 10^8 ohms the accuracy is limited by the inability to read the small meter deflections precisely.

DISCUSSION

The type of data obtained with the resistance tester and the correlation between data from this instrument and the static tester are shown in Table I. The data are for the electrostatic properties of several natural and synthetic fabrics. Excellent correlation has been found between the resistivities of fabrics and the half-life periods of charges on those fabrics. Such correlation would not be expected between the resistivities and charges produced on the fabrics because the net charge is the resultant of several factors, among which is the resistivity. The data in Table I show that as the electrical resistivity decreased, the charge on a fabric was dissipated more readily, and the half-life period of the charge therefore decreased. An increase in humidity, if it resulted in an increased concentration of water on a fabric, decreased the resistivity. The accuracy of results with the resistance tester is greatest below resistivities of 50,000 x 10^8 ohms, whereas the accuracy with the static tester falls off for test specimens of low static propensity.

The data shown in Table II are for nylon treated with two antistatic agents, and show the range of resistivities that may be obtained. The resistivity of nylon fabric can be decreased by as much as 10,000 times by treatment with a suitable antistatic agent. A fabric possessing such a relatively low resistivity would be expected to accumulate and hold markedly less electrostatic charge than cotton under the same conditions.

REFERENCE

(1) Hayek, M and Chromey, F C, *Am Dyestuff Reptr* 40, P164 (1951).

Report of New York Section Meeting

Hotel New Yorker, New York
March 9, 1951

A MEETING of the New York Section was held on Friday evening, March 9th, 1951, at the Hotel New Yorker, New York, N Y. An informal dinner preceded the meeting.

Paul J Luck, Chairman, introduced the new chairman of the Corporate Membership Committee, Richard Monsaert, Jr, and then proceeded with the technical program.

The speaker was Dr Charles Weidmann, Technical Director of Ciba Company, Montreal, Canada, who discussed "The Standfast Molten Metal Continuous Dyeing Process" on behalf of Standfast Dyers and Printers, Limited, Lancaster, England. Following Dr Weidmann's presentation there was considerable discussion in which Commander R S Hannay, Chairman of Standfast Dyers and Printers, also participated.

The attendance was 460.

Respectfully submitted,
NORMAN A JOHNSON
Secretary

March 9th Meeting of New York Section: Dr Charles Weidmann, Ciba Company, who discussed "The Standfast Molten Metal Continuous Dyeing Process"; Paul J Luck, Calco Chemical Division, Chairman of the New York Section; Commander R S E Hannay, Chairman of Standfast Dyers and Printers.

General Technical Session——

THE WATER-POLLUTION PROBLEM*

LYMAN COX
Engineering Department
E I du Pont de Nemours & Company, Inc

I AM sure that all of you have heard a great deal about water pollution and the need for conserving the surface-water resources of the country. This is a matter of great importance and one which presents a serious problem on a nation-wide basis.

Pollution interferes with many necessary and desirable uses of water and should, therefore, be a matter of concern to everyone who is interested in preserving this great natural resource. What is frequently overlooked or not realized, however, is the fact that pollution tends to be cumulative. That is to say, in many cases a water course might easily handle the waste discharged at a given location, if waste from no other location reached the stream. However, with the increasing population and greater industrial activity, more and more of a load has been placed on the streams from many sources. These multiple sources of waste produce an additive effect which can, and in many cases does, make the water unsuitable for one or more of the many uses that would normally be made of it.

This naturally attracts the attention of those who find themselves deprived of the benefits that they have been accustomed to enjoy. For example, polluted streams present a problem to those who operate water-treatment plants and are, therefore, charged with the responsibility of delivering wholesome, palatable water to great numbers of people; to industrial concerns which draw their supply from a stream and then make further use of it as a medium for diluting waste; to those who use streams for navigation and find in many cases that damage is done to boats and marine structures; to those who live on the banks of these streams and find their property to be less valuable because of the pollution; and, last but not least, to those who make use of streams for fishing, swimming, boating, and other recreational pursuits.

The two uses which have accounted for the largest number of laws and the greatest degree of regulation are water supply and recreational enjoyment. The first of these bases its plea for cleaner streams on public health.

Since all of us enjoy swimming and fishing, it is not hard to understand the objections that arise when pollution ruins a body of water for recreational use. To most people the polluted water looks bad, smells bad, and does not have any fish in it. This is often true, but sanitary engineers and others concerned with the condition of streams base their judgment on chemical and biological tests which show the condition of the stream.

Lyman Cox

Pollution of water, because it interferes with the desirable uses and purposes of that natural resource, is an important national problem. Pollution can be caused either by natural sewage, which markedly raises the bacterial count, or by industrial waste, which normally contains few or no bacteria.

Industry's civic duties in pollution abatement are as follows:

1. To develop full information about its own waste and take necessary corrective action.
2. To educate its own employees.
3. To cooperate with municipal officials.
4. To cooperate with State, Interstate and Federal control agencies.
5. To keep the public advised concerning the problem and the progress which is being made.

The effect that a given waste will have on the water depends to a considerable degree upon the characteristics of the waste. Domestic sewage, for example, unless treated, will tend to reduce the oxygen content of the receiving water, to increase the number and kind of bacteria present, make the water unsightly because of floating solids, or form sludge deposits in quiet sections of the stream.

The reduction in the oxygen content, mentioned as the first effect which domestic sewage has, comes about as a result of bacterial action. The bacteria utilize the organic matter in sewage for food, and, in doing so, consume the oxygen which is dissolved in the water. This action can reduce the oxygen to such low levels that it will not be possible for fish and other aquatic organisms to survive. The increase in the kind and number of bacteria may make the water unsuitable as a source of supply for a municipal or industrial treatment plant, or make the water unsuitable for swimming. In tidal waters, clams, oysters, and other edible shell fish growing in the sewage-polluted water frequently become unfit for human consumption. The third effect which was mentioned, namely, unsightly floating solids, is offensive and undesirable. The fourth factor, sludge deposits, can affect the water course in several ways, the more important being blanketing the bottom with a material which smothers plant and insect growth, thus interfering not only with the availability of fish food but also with the spawning habits of certain species of fish. Under certain conditions, such sludge deposits can also cause serious depletion of the oxygen resources of a stream.

Industrial waste may have the same effect on a water course as sanitary waste except that industrial waste rarely causes bacterial pollution. Also, industrial waste may alter water quality in a number of other ways. For instance, if a sufficient quantity of a toxic material is introduced into a stream, the fish may be killed out or driven away, and bacterial life in the water may be sufficiently altered so that

* Presented at the Twenty-ninth Annual Meeting in Portsmouth, N H, on Sept 28, 1950.

the normal ability of the stream to consume organic matter by oxidation is impaired. Also, taste and odor in public water supply may result. There may be undesirable changes in the normal alkalinity of the stream, or detrimental changes in the mineral content or hardness of the water.

The quality of surface water has been gradually deteriorating in some parts of the country for many years. Public interest in the subject has developed rapidly. This has come about in part as a result of the efforts which many groups have made to educate the public, and, in part, because a larger number of people have leisure time for such recreations as fishing, boating, or other activities that are possible only when the available waters are relatively clean. The results of all of this is a popular country-wide demand for a cleanup.

In the protection of waters that are now clean and in the restoration of waters that have been affected by excessive pollution, an effort is usually made to reduce existing pollution and to control new sources by requiring that both industries and towns provide adequate treatment for expansions or new installations.

Widespread interest in stream pollution has caused public pressure for improvement. This has resulted in the passage of a great deal of legislation on the subject. The laws which deal with industrial waste are usually state laws enacted to protect the natural resources of the country and to preserve the public health and welfare. Such laws began to pass with increasing frequency just prior to the second world war. Since the end of the war a large number of additional laws have been passed or existing laws have been amended. There are only two or three states which do not seek to control stream pollution by special legislation.

Nearly all of the more recent laws tend to be comprehensive in that they seek to control the discharge of both municipal and industrial waste and to preserve and restore the purity of streams sufficiently for a variety of uses. The general method of doing this is to establish a central control board and delegate administrative and enforcement powers to the board.

In addition to the state laws on the subject, there are a number of interstate compacts. These usually result in the establishment of a commission, which has prescribed jurisdiction over the waters of several states. Some few have the authority to set up and enforce regulations. Most of them, however, direct their efforts toward securing the enactment of uniform legislation in the states involved, conducting educational campaigns, examining river systems to determine the extent of pollution, and recommending steps which the various states should take to reduce pollution to an acceptable level. In many cases they promote the adoption of uniform standards of water quality and are able to exert a considerable amount of influence on the action taken by the pollution-control agencies in member states.

The whole northeast section of the country is now under compact. These apply specifically to the New England states, coastal waters of Connecticut, New Jersey and New York, the Delaware River Basin, the Potomac River Basin, and the Ohio River Basin.

Above the state level there are three or four Federal laws which deal with the subject. The ones that affect industry are the Rivers and Harbors Act of 1899, as amended, which is administered by the Army Engineers Corps, the Oil Pollution Act of 1924, which is administered by the Army Engineers with the assistance of the Coast Guard, and the Federal Water Pollution Control Act, a comprehensive law, passed in June of 1948, which delegates certain duties and authorities to the Federal Security and Federal Works Agencies. Under this law the Federal authorities can enter suit for the abatement of pollution of interstate waters, provided the state control agencies agree, and certain other steps outlined in the act have been taken. However, the primary responsibility of the states for the control of water pollution is recognized, and the main purpose of the comprehensive law is to encourage and assist the states, to promote research and co-operative efforts to abate pollution and to develop a comprehensive water pollution abatement program. The main job of administering the federal Water Pollution Control Act, Public Law 845, was assigned to the Public Health Service of the Federal Security Agency. The Service has established a Division of Water Pollution Control, which in turn has organized and staffed some ten Basin Offices. The Basin Officers have been engaged in collecting data from the states on the extent of water pollution in the United States as a basis for the comprehensive program which they are to prepare, and to show the extent of the problem. These data will also be used as a basis for selecting research projects and allocating funds to other agencies for research on industrial waste treatment.

This year the Public Health Service formed the National Technical Task Committee on Industrial Waste. This was done by inviting a number of trade associations and professional groups to appoint representatives for the purpose of forming such a committee. The committee was formed to promote industrial cooperation and the exchange of technical information on waste-treatment methods. The Health Service will also look to the committee for advice concerning needed research work.

If everyone had enough interest in water conditions to treat sewage and industrial waste where necessary prior to discharging it into surface waters, there would be little excuse for all these laws, rules, regulations, committees, State commissions, Interstate and Federal agencies. However, since the custom of simply discarding any unwanted material into a water course has been a long-time practice in too many cases, it takes more than a little persuasion to change the custom and to restore waters to usable conditions. This is understandable since it is sometimes difficult to see why waste should be treated, and one can find many reasons to justify oneself in continuing the practice of discharging waste without treatment. I think the four more important reasons would bear examination. Briefly, these are as follows:

1. Waiting for the other fellow to make the first move.
2. Other and seemingly more important demands for tax dollars and industrial earnings.
3. Failure to recognize the problem, and
4. Failure to understand the need for reducing pollution.

If we examine these reasons one by one, waiting for the other fellow makes a good excuse. The fellow upstream has already ruined the river, so there is little point in spending money to treat the waste. Then, too, those located downstream are out of sight, out of mind, and the waste really doesn't hurt the river or interfere with them anyway. It is true that there are many demands for the dollars collected in taxes and for the earnings of industry. The new road or the new auditorium, or the new school seem to have a great deal more glamour than a new sewage-treatment plant. By the same token, new production facilities or better machines or some other plant need may seem to be more pressing than installations to reduce pollution. However, the time has come when pollution abatement assumes greater importance. The demands on water are growing at an ever-increasing rate. The amount of clean water available to satisfy these needs has been decreasing at just as rapid a pace. Water must be regarded as one of our most valuable natural resources and must be protected to the extent that dilution of waste does not interfere with other reasonable and necessary uses. It is also true that many people are misled by appearance. A waste may appear to be harmless and yet cause serious pollution if it contains large amounts of dissolved organic matter or appreciable quantities of toxic materials. It is therefore possible

for an industry to cause pollution without being aware that its wastes have any effect on river conditions.

The last point which was mentioned, namely, failure to understand the need for reducing pollution, is probably one of the most important deterrents to action. This can only be resolved through education and study. To repeat an earlier statement, there are far too many instances where water has been regarded as a convenient place to dump things that were not wanted. The effect of this dumping on the stream has been unknown and a matter of no concern until someone started complaining. Actually this attitude is just plain wrong. The water does not belong to any individual. It belongs to all of the people, and where an industry or town has rendered it unfit for reasonable use, they have not been very popular. There are streams in this country so loaded with sewage and industrial waste that all of their natural beauty and usefulness have been destroyed. They have become foul, slimy, dead things that creep through the land leaving an ugly smear and an unwholesome smell behind. In these streams there is no life. They cannot be used as a source of water supply or in any other way. Eventually the lovely homes on their banks will become shabby and rundown—almost as ill-kept as the stream itself.

I am not an optimistic enough engineer to think we can return all streams to their pristine state nor an ardent enough fisherman to demand that we make a trout stream out of every creek and river, but it is obviously wrong to ruin a stream for every other use by the wasteful and unthinking appropriation of it for the one use of waste disposal. In tackling the water pollution problem, we must develop the facts concerning water conditions and then bring about sufficient improvement so that the water can be gradually returned to its most beneficial public uses.

To expand this idea a bit, I would like to give you my views concerning the type of goal that should be set. As mentioned earlier, water has many uses. For a given stream certain uses will be much more important than others. The goal for pollution abatement should be the maintenance of a water quality which is satisfactory for the more important uses that are being made or may be made of the stream. That is to say, a lovely creek in the country should probably be of such quality that is supports game fish and is therefore used primarily for recreation. Some other stream might be of greatest importance from the standpoint of municipal and industrial water supply. Still another stream might be useful mainly for transportation and for dilution of waste. In other words, no attempt should be made to return all streams to their original condition. The degree of improvement should be based on stream use.

Solving the pollution problem is a big job. The State Control Agencies recognize the fact that it will not be possible to make substantial progress without the full support and co-operation of municipalities and industries. Actually the basis for such support is recognition of the problem and recognition of the importance of conserving water and maintaining reasonable standards of quality so that water can meet the many demands placed upon it. It has been my experience that enlightened industry wishes, in fact finds it vitally important in combatting the present trend toward big government and socialistic thinking, to be a good neighbor and a good citizen. This means, of course, among other things, industry must recognize its responsibility for solving a part of the pollution problem and must accept its civic duty for doing so. I would like to talk for a little while about industry's civic duty in pollution abatement, and I think we might start by listing what appear to me to be the primary civic duties in pollution abatement which are peculiar to industry. These are as follows:

1. To develop full information about its own waste and to take necessary corrective action.
2. To educate its own employees.
3. To co-operate with municipal officials.
4. To co-operate with State, Interstate and Federal control agencies, and
5. To keep the public advised concerning the problem and the progress which is being made.

These five items then—to learn about our own waste, educate our own employees, co-operate with responsible officials, and keep the public advised—are the civic duties of industry in pollution abatement. The first of these, namely, to develop full information about particular waste and take necessary corrective action, is the one which is likely to require the most effort in terms of manpower and investment. In considering what is involved in such an undertaking, the first requirement is that management recognize the industrial waste problem and be willing to set up a suitable organization to direct and co-ordinate the work.

Pollution abatement, industrial waste disposal, control of water-borne industrial waste; choose what name you will, the problem is a management problem because it combines the elements of finance, law, public relations, research, organization, and administration, elements which are of first importance to management.

It will be found that the industrial pollution-control program is a part of many other industrial endeavors or areas of specialized direction and effort. To name a few, waste disposal must be carefully considered in research and new-product development, in design and plant construction, in plant-site selection, in manufacturing and maintenance, and in employee and community relations. It would not be surprising to see it crop up in advertising—a new selling point known as "waste appeal." That isn't as farfetched as it may seem. Take textile sizing for example, the natural materials, starch, casein, gelatin, dextrin, and gums, all have a high demand for oxygen, whereas some of the substitute materials manufactured by the chemical industry have little or no demand for oxygen. If the fabric manufacturer uses chemical sizing with a low B O D (biochemical oxygen demand) instead of a natural material, the operator of the dye plant will have much less of a waste-disposal problem when he washes out the sizing. In other words, one manufacturer might solve another's waste problem by selecting a nonpolluting material.

In fact, the du Pont Company has been investigating certain of its products with this idea in mind. This investigation shows that "Elvacet" polyvinyl acetates and "Elvanol" polyvinyl alcohols have biochemical-oxygen-demand values which are only 3 to 10% of the values exhibited by the more common sizing materials, starch, casein and gelatin. One du Pont product, low-viscosity CMC, sodium carboxymethylcellulose, has a B O D of less than 1% of that attributable to the common sizing materials. This means that to the extent that your waste problem is caused by sizing materials, a B O D reduction of from 90 to 99% could be effected by obtaining material which had been sized with the chemical materials instead of the regular materials.

To return to our list of civic duties, the second one mentioned was education of our own employees. If satisfactory progress is to be made in reducing pollution at the source, it is important to remember that leaks and spills, when added together, account for a sizable share of industrial pollution. It is absolutely essential that the people who push the buttons, pull the levers and turn the valves understand how their actions are related to pollution and the things which they can do to decrease the amount of waste which is discharged from the plant. The key to this is education.

Totally aside from reducing wastes, you will be boosting employee morale. Many employees enjoy fishing, swimming, and other recreational pursuits and they will be sympathetic toward efforts to reduce

pollution. What's more, they are quite likely to take pride in the fact that the company for which they work is making a concerted effort to bring industrial waste under control. In other words, they will be interested in information concerning pollution control and the things which they can do to help out. Such educational efforts can take several forms.

Plant magazines and employees' papers offer an excellent medium for presenting the pollution-abatement story. Posters, displays, letters addressed personally to employees and fly sheets describing a particular problem can all be used effectively. The showing of such pictures as the General Electric film "Clean Waters" and special meetings to discuss the general subject are also of considerable value. Once such a program has been undertaken, an effort should be made to solicit suggestions for the reuse or recovery of waste. By inviting ideas and suggestions for reducing the amount of waste, people will be reminded of their responsibility in the matter, and a backlog of information can be built up which will serve as a source of useful ideas in developing methods for eliminating waste.

The third item in our list of civic duties was co-operation with municipal officials. It is often desirable to discharge industrial waste into a municipal sewerage system. If this is contemplated, discussions should be held with the city officials who are responsible for the operation of the municipal sewage-treatment plant, so that definite agreements concerning the quality and quantity of waste which can be handled at the municipal plant will be reached. Industrial waste can be satisfactorily treated along with municipal sewage, provided it desn't overload the municipal plant or contain sufficient quantities of toxic materials to upset the treatment process. Care should also be taken to avoid the discharge of materials which will cause damage to the collecting system, which will cause clogging of the sewers, which are flammable, or which will cause objectionable gases to form in either the sewers or the treatment plant. This means that in many cases it will be necessary either to pretreat the industrial waste or to segregate certain wastes for separate treatment.

The fourth item in our list is co-operation with State, Interstate and Federal control agencies. The men responsible for the administration and enforcement of pollution-control laws wish to co-operate with industry. Hence, it is desirable to become acquainted with them and work together on a co-operative basis. This policy has the advantage of keeping the officials advised of the progress which is being made and strengthens their position in responding to public inquiries about the abatement of stream pollution. Public opinion is essentially the force which has aroused present interest in stream-pollution control. The public deserves to be informed about efforts which are under way to reduce pollution and the progress achieved.

It isn't enough to do a good job. You must let the public know about it. I recall hearing an address on the public-relations aspect of the pollution problem in which the speaker stated that in considering the public-relations implications of the subject we must recognize from the outset that all pollution-control activity is a public-relations matter, and that the time and effort and the money which a company spends for this work are directed either toward achieving or maintaining the goodwill of its neighbors. It seems to me that this view is correct and that in the last analysis it is necessary to let people know what the problem is and what progress has been made to date in solving it.

In trying to get your story across to the public, any efforts you have made to educate your own employees will pay off. They will have frequent opportunity to talk to others about the plant, and if they are "in" on the pollution control work, they can be counted upon to tell the company's story. The local newspaper is another excellent means for keeping the public informed.

Another method for getting the story across to the public is through public meetings of one kind or another. If you have a story to tell and men who are willing to serve as speakers, there will be plenty of opportunities to address local service clubs and other groups interested in civic affairs.

For industry to solve its part of the pollution problem and carry out its civic duty for pollution abatement, I think that the five items that have just been discussed in detail may be summed up by saying: Learn all there is to know about your own waste; then, with the advice and assistance of representatives from your local pollution-control agency, make an honest effort to reduce pollution to a level which will permit others to make reasonable use of the water. And don't hide your light under a basket. When you take these steps you are doing a real public service. The community deserves to know that you are concerned about the water-pollution problem and are doing your part to solve it for the common good.

DISCUSSION

Question: Do waste sodium sulfate and sodium chloride constitute pollution in surface waters?

Answer: I think up to 250 parts of these chemicals per million parts of water can be tolerated without change in the propagation of aquatic organisms or without interference with municipal requirements.

Q: You mentioned the ten Basin Offices controlling water pollution?

A: Yes, the drainage of the United States has been divided into ten principal control basins with an office for each in an important city, such as New York, Cincinnati, Dallas, Atlanta, etc.

LAPEL BUTTONS for AATCC MEMBERS

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These buttons bear the Seal of the Association and may be purchased by members in good standing from the National Secretary at $2.00 each.

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DR H C CHAPIN
LOWELL TEXTILE INSTITUTE
LOWELL, MASSACHUSETTS

PLEASE NOTIFY THE NATIONAL SECRETARY OF ADDRESS CHANGE

Trade Practice Conference for Revision of Rules for the Rayon Industry

A TRADE practice conference for the Rayon Industry will be held by the Federal Trade Commission in the Bowman Room of the Hotel Biltmore, Madison Avenue and 43rd Street, New York, N Y, on April 12 and 13, 1951, beginning at 10 am, for the purpose of considering the revision of trade practice rules for the Rayon Industry promulgated by the Commission on October 26, 1937.

The Honorable James M Mead, Chairman of the Federal Trade Commission, will preside.

All interested persons, firms and organizations are invited to attend and may take part in the discussion of such revision of the existing trade practice rules as may be proposed or suggested by the members of the industry at the conference. The conference will afford all segments of the industry an opportunity to co-operate with the Commission in establishing adequate rules for the elimination and prevention of unfair or deceptive acts or practices and unfair methods of competition, thus affording protection to both industry and the public and guidance to all concerned.

The Commission has authorized the conference proceeding upon the application of the Rayon Yarn Producers Group, consisting of all the major domestic producers of regenerated cellulose yarns and all of the companies engaged in the production of cellulose acetate rayon yarns in the United States. Applications for revision and amendment of the rayon rules were also received from the National Retail Dry Goods Association and the National Institute of Cleaning and Dyeing.

The Rayon Yarn Producers Group ask that the definition of the term "rayon" in the existing rayon rules be modified so as to apply only to the regenerated cellulose yarns and textile products made thereof; that the term "acetate" be required as descriptive of cellulose acetate yarns and the textile products made thereof; and that the labeling rules be changed to conform to these modifications. The Group also proposes amendment of rules relating to mixed goods, adulterants, and trade-marks, and further proposes amendment of Group II rules relating to disclosure of proportions of mixed fibers and information as to the treatment and care of products.

After the conference, and before rules are finally approved by the Commission, a draft of proposed rules in appropriate form will be made available to all interested or affected parties for consideration and hearing. Such subsequent hearing will be announced by the Commission through notice giving the time and place thereof and all persons, concerns, or organizations affected by the rules, or having an interest in the matter, will be afforded opportunity to be heard and to submit for consideration their views, criticisms, and suggestions.

30th ANNUAL CONVENTION

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AUSPICES OF NEW YORK SECTION

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HOTEL STATLER NEW YORK, N Y OCTOBER 17-18-19

Members of 1951 Convention Committee at March 9th Meeting of New York Section: front row — Samuel A Pettus, Du Pont (Transportation); Dr Eugene W K Schwarz; Paul J Luck, Calco Chemical Division (Co-chairman); Charles W Dorn, J C Penney Co (Co-chairman); Norman A Johnson, Dyestuff Reporter (Printing); second row — Ernest H Hart, Richmond Piece Dye Works (Reception); Dr Herman E Hager, General Dyestuff (Ladies); Henry L Young, Interchemical Corp (Exhibits); Patrick J Kennedy, Du Pont (Student Contest); back row — John H Hennessey, General Dyestuff (Registration and Finance); Herman E Wilde, Merck (Entertainment and Equipment); Leonard S Little, Consultant (Symposium).
Other members of the committee not present at the time the photo was taken are: William A Holst, Jr, National Aniline (Technical Program); Weldon G Helmus, Fair Lawn Finishing (Banquet), and Kenneth A Howry, Daily News Record (Publicity).

ABSTRACTS

An Evaluation of Four Laboratory and Two Wear Test Methods for Measuring Perspiration Colorfastness in Rayon Fabrics

P B Mack, M V Jones, S Davison, and M K Knight, *Textile Research J* 20, 862-9, December, 1950.

This study covers a comparison of four methods of applying artificial perspiration in laboratory tests, each with a series of seven drying times, parallel with two series of human wear tests. Thirty-two fabrics representing a wide range of perspiration colorfastness were used throughout the laboratory trials: 10 of these were used in one and 8 in another series of wear trials.

The laboratory tests were as follows:

Commercial Standard Test Method. The CS 59-44 test for acid and alkaline perspiration was employed.

Glass Plate Test Method. This differed from the AATCC method only in that single glass plates of greater thickness were used instead of two thinner plates, and 9 instead of 10 lbs of pressure were used.

Roll Method. The test sample and composite cloth were dipped into the perspiration until thoroughly saturated. The composite cloth was laid against the right side of the test fabric, and the two were rolled together with the composite cloth on the outside of the roll.

Glass Rod Method. A modification of the tentative AATCC glass rod method for determining colorfastness to perspiration was used.

The wear tests were made by exposing patches of the fabrics to the human skin for 140 hours, either sewed to muslin belts worn around the waist or attached to dress shields.

Results: The test method embodied in Commercial Standard CS 59-44 tended to be the least severe of any of the four test methods for any of the seven test periods studied. The three other methods, all providing firmer contact of the test specimen with the white composite test swatch, gave results which were highly comparable with each other. Shorter periods of test by these other methods, therefore, could be substituted for the longer CS 59-44 test.

Laboratory test conditions were compared with a variety of wear results. A glass plate method employing a test period of 6 hours, recently recommended in a Research Report of the AATCC, was evaluated critically in terms of the results of the wear tests, with the finding that the test would predict with reasonable accuracy the perspiration damage incurred by actual wearing of the fabric.—WHC

Properties of "Terylene" Filament Yarns and Staple Fiber

Anon, *Textile Mfr* 77, 29-31, January, 1951

The principal physical characteristics of Terylene are good color, high moisture resistance, exceptionally high initial modulus of elasticity, and very high dry and wet strength.

Terylene is outstanding in its resistance to organic and mineral acids, but is somewhat sensitive to alkalis. It resists oxidizing and reducing agents and is unaffected by the common organic solvents used in drycleaning. Its resistance to heat, light and weather, bacteria and insects is excellent.

If a flame is applied to Terylene it melts, but does not support combustion and does not glow after the flame is removed.

No case of dermatitis or other skin troubles directly attributable to contact with the fiber has yet been encountered.

Terylene is a thermoplastic fiber and fabrics made from it must be "set" before being dyed or processed at elevated temperatures if permanent creasing is to be avoided.

The dyestuffs applicable to Terylene by substantially conventional methods are selected members of the dispersed acetate range, while some members of the azoic series can be applied by a modified technique. In addition, Terylene fabrics can be dyed by high temperature heating processes, using both dry and wet heat. It is too early, however, to forecast what may be the commercial importance of these methods.

Finally, it is possible to dye the Terylene polymer itself in controlled manner, so that on subsequent extrusion and drawing already colored yarns or staple fiber can be produced.—WHC

Bonded Fabrics

C E Coke, *Textile Mfr* 77, 12-14, January, 1951

"Bonded fabrics," or "nonwoven fabrics" identify a group of materials consisting of a web or mass of fibers held together by a bonding agent.

As a rule, manufacturers of these materials in the United States use either all-cotton, a blend of cotton with viscose rayon, or all-viscose rayon, but other fibers can be utilized if desired. Some producers use a blend of one of these fibers with either acetate rayon staple or Vinyon. The latter fibers, when subsequently heat or solvent treated, act as the bonding agent in the finished material.

Bonding agents in use today, besides those already mentioned, include polyvinyl acetate, polyvinyl alcohol, and polymers of the vinyl chloride-vinylidene chloride and styrene-butadiene types. The author describes three different methods of applying the bonding agents to the web of fibers.

Most commercial bonded fabrics today vary in weight between 0.4 and 8 oz per sq yd. As with weight, the thickness of a bonded fabric can be varied widely, and it is determined by the end use.

Speaking generally, the tear resistance of bonded fabrics is poor compared with that of woven fabrics. Abrasion resistance is also relatively poor.

Bonded fabrics can be made which will take up as much as 15 times their own weight of water without disintegrating or lumping up when wet. At the other extreme, bonded fabrics can be rendered water-repellent by treatment with wax emulsion type of finish.

There are eight manufacturers in the USA producing in considerable quantity. No accurate figures are available, but it is possible that these eight are currently making some 50 million yards of bonded fabric per annum. It is interesting to speculate on the possibility of making these fabrics from textile fibers on paper-making machinery because of the vastly greater speed of operation.—WHC

New French Fibers

Anon, *Dyer* 105, 46-7, 49, 51, January 12, 1951

The Rhovyl Company, a French firm, recently issued full details of the properties and application of four polyvinyl chloride fibers—Rhovyl, Fibravyl, Thermovyl and Isovyl—now being made by the company.

It is understood that substantial quantities of Rhovyl products have already been sold in the British market, and that demand during the last six months has been

so large that it has outstripped production.

The Rhovyl fibers are reported to have the following characteristics:

(1) They are not inflammable; this property is not obtained by any special fireproofing process and is an inherent quality; moreover, it is permanent.

(2) Fabrics made from Rhovyl fibers are claimed to be impervious to water, and as a result, their mechanical qualities (e g, tenacity, elasticity and elongation at rupture) are the same both in the dry and in the wet state.

(3) Textiles made from Rhovyl fibers are resistant to practically the entire range of inorganic chemicals — concentrated acids, concentrated alkaline solutions, and reducing and oxidizing agents. The fibers are, however, susceptible to the action of certain organic solvents.

(4) Rhovyl fabrics do not get moldy, and they can be buried for a year in contact with vegetable or animal refuse without suffering any damage. They are also proof against insects (mites) and against rodents.

Rhovyl comes into the market in the form of continuous filaments. Its strength is claimed to be particularly good, wet or dry. At approximately 176°F dry and 167°F wet, it starts to shrink. This shrinkage can be prevented by mechanical means.

Fibravyl is Rhovyl in the form of staple fibers. Thermovyl is similar to Fibravyl but comes in coarser filaments, with lower breaking strength but heat stability up to 212°F. Isovyl is a large-diameter fiber.

There is little in the article about dyeing these new fibers. Rhovyl and Fibravyl, on account of their low softening point, cannot be dyed or dried at temperatures above 140°F. Thermovyl, however, may be treated in water in the neighborhood of the boiling point.—WHC

The Role of the Disulfide Bond in Reactions Which Render Wool Nonfelting

P Alexander, D Carter, and C Earland, *J Soc Dyers Colourists* 67, 23-7, January, 1951.

Wool can be rendered nonfelting by reaction with a large number of chemical reagents, all of which either modify the surface of the fibers or react extensively throughout the fiber to bring about a change in elastic properties. Attack on the fiber surface can be of two kinds—it may result in loosening the whole of the scales, so that they become detached on rubbing; or the reaction may be confined to the scale tips, which become gelatinized and glued to the underlying fiber, and thus lose their power of bringing about the differential frictional effect *(DFE)* necessary for felting. All commercial nonfelting processes function by surface degradation, and Speakman considers that all reagents capable of reacting with the disulfide bond, and in particular those which do not produce new cross-links, are effective for this purpose.

It is shown in this paper from experiments with peracetic acid that breakdown of the disulfide bond alone does not remove the *DFE* of wool fibers and thus cannot bring about nonfelting by surface attack alone. Extensive disulfide bond breakdown without attack on other groups renders wool nonfelting by modification of the elastic properties of the fibers as a whole. It is concluded that, to remove the *DFE* of a fiber and to render wool unshrinkable by attack on the surface only, two reactions are necessary—first, as recognized by Speakman, splitting of the disulfide bond without formation of a new cross-link; and second, breakdown of the wool molecule at another point, which in the case of the well-known antishrink processes probably occurs at the tyrosine residue in the polypeptide chain. —WHC

Dyeing Unions Containing Nylon

J G Grundy, *J Soc Dyers Colourists* 67, 7-17, January, 1951.

The outstanding physical and chemical properties of nylon have already ensured its place in the textile field, and as a result, designers and manufacturers have explored the possibility of using this fiber in union with older textile materials. As the dyeing properties of nylon in many cases differ appreciably from those of other textile fibers with the same dyes, special attention has to be paid to the production of solid shades and two-colored effects on unions containing nylon. In this review the following unions have been considered:

(1) *Nylon and Acetate Rayon.* Dyes from the range of dispersed dyes for acetate rayon are suitable for dyeing solid shades on this union. If necessary the shade of the nylon can be corrected by the judicious use of neutral-dyeing wool dyes. Two-colored effects are obtained by using direct and acid dyes, which dye nylon and resist acetate, and over-dyeing the acetate with dispersed dyes.

(2) *Nylon and Silk.* Neutral wool dyes and selected dyes from the Neolan range may be used to produce solid shades.

(3) *Nylon and Wool.* A carefully selected combination of mono- and di-sulfonated dyes will give reasonable results in medium depths over a wide range of shades. Full shades are obtained with neutral-dyeing acid dyes. A combination of Neolan dyes is also recommended for both pale and medium shades. The usefulness of chrome dyes for this purpose is somewhat limited.

(4) *Nylon and Cellulose Fibers.* The material may be dyed in a single bath with a combination of selected direct colors and either dispersed acetate dyes or neutral-dyeing wool colors; or the nylon may be dyed first with wool dyes, and the cellulose fiber dyed in a second bath with direct colors. Vat dyes for the cellulose fiber, topped with dispersed or neutral-dyeing wool dyes, form another possibility.—WHC

Reaction of Formaldehyde with Cotton

C F Goldthwait, *Textile Research J* 21, 55-62, January, 1951.

Partially methylenated cottons have been prepared by the reaction of cotton with formaldehyde under acid conditions in nonaqueous (mainly acetone) solutions. Although it does not differ from ordinary cotton in appearance and general textile character, the modified cotton displays new properties even at relatively low formaldehyde contents—from 0.5% to 1.5% —which may prove to be of practical importance.

The progress and uniformity of the reaction can be followed not only by analysis for combined formaldehyde, but also very conveniently by a determination of the reduction in the capacity of the cotton for taking up a direct dye. This work affords an excellent example of the possibilities of such dyeing techniques.

Dye-resisting yarns of possible technological interest can be produced. The dye-resisting effect appears to be mainly due to cross-bonding in the cellulose.

The treated cotton has a decreased swelling capacity in water and in other agents which swell or dissolve cotton.

Products of sufficient formaldehyde content have good resistance to biological rotting.

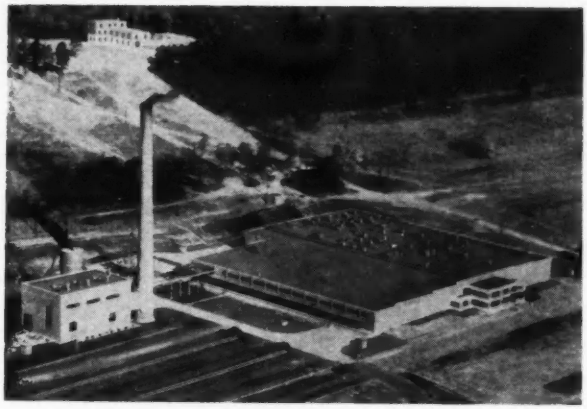
Direct cotton dyes are made faster by the treatment.

The cotton tends to lose strength as a result of acid hydrolysis and "embrittlement," but adequate strength can be retained for its prospective uses.

Effects of moisture that is originally present in the cotton and in the reaction mixtures indicate that the state of swelling of the cotton at the time of treatment is especially significant in determining the properties of the reaction products.

Methods described can be employed for the production of partially methylenated cottons of good uniformity and low degrees of substitution.—WHC

NEWS



Burlington Mills' Finishing Plant at Altavista, Virginia

• Burlington Increases Altavista Capacity

Burlington Mills Company has launched a major expansion program at their new finishing plant at Altavista, Virginia, including 125,000 square feet of warehouse space plus a 15,000 square foot addition to the warehouse. General contract for the entire project is held by the Daniel Construction Company.

The warehouse is a one-story structure, with concrete floors, load bearing brick walls, with cinder block backing, brick face, concrete roof slabs and tar and gravel roof finish. The dye house addition duplicates the facilities now being used and permits expanded production, it is reported. It is air-conditioned, finished in glazed tile, with structural steel frame and red brick exterior, trimmed with white limestone to match the exterior of the existing building.

The plant proper, which is totally enclosed, is also air-conditioned. It has its own water purification system, power plant and waste disposal system. The tile interior and day-bright lighting are said to contribute to greater efficiency along with the continuous process circuit, made possible by the fact that all operations are on one floor.

The addition is reported to have cost over $750,000. The original structure, reportedly built at a cost of $3,000,000, was completed in 1949 by the same builder.

• Dexter Expansion Reviewed

Speaking at the semi-annual sales meeting of the Dexter Chemical Corporation, New York, Joseph B Evans, Director of Sales, recently traced the organizational growth of the company as evidenced by an all-time sales record made in 1950 and by the addition of personnel and of plant facilities. He pointed out that within the past six months, Dexter has added two men to the sales force and has set up a staff to handle the company's promotion activities.

The company's technical achievements were reviewed by Sidney M Edelstein, Technical Director. He stated that in addition to new plant and laboratory equipment, work is progressing on the development of finishes that have special application for military fabrics. Following Mr Edelstein's report, Azel Mack, New England Sales Manager of the company introduced a new application of Maxitol as a penetrant and softening agent for wool, stating that many wool and worsted mills are now using this agent with unusual success in obtaining a loftier appearance and resiliency which cannot be removed from the goods by subsequent operations.

At the second day's session, the company's promotion program for 1951 was previewed and the meeting concluded with a presentation of life insurance policies contributed by the company to each of its sales and executive personnel.

• Apex to Build at Elizabethport

Apex Chemical Co, Inc, New York, has awarded a contract for the construction of a three-story steel, brick and glass manufacturing building at its plant in Elizabethport, N J, a new structure which reportedly will centralize all manufacturing activities and will join the laboratory, other manufacturing buildings and shipping department into one unit.

• Rep Cooley Urges "Ambassadors of Friendship"

In an address delivered as a feature in the B B Gossett Lecture Series, Congressman Harold D Cooley of Nashville recently urged foreign students in the North Carolina State College School of Textiles to become "ambassadors of friendship" and to "take back to your native lands a message from America."

More than 400 students were on hand to hear Rep Cooley in the new auditorium of the School of Textiles. He was introduced by Malcolm E Campbell, dean.

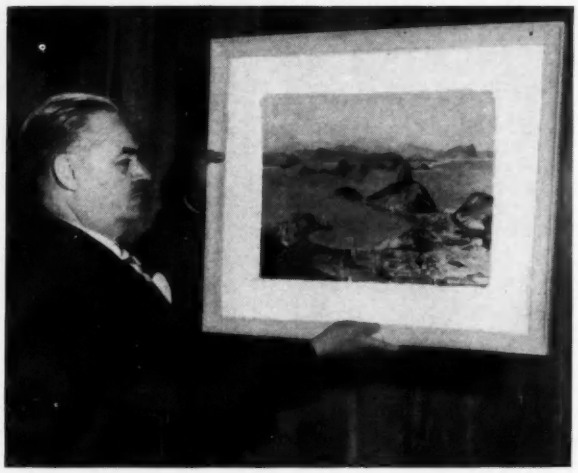
• Emery Opens Direct Sales Office in Chicago

Emery Industries, Inc, recently announced the discontinuance of the services of their Chicago representative, Clarence Morgan, Inc, and the opening of a direct sales office at 221 N LaSalle Street, Chicago, on April 1. Rapid development of specialized products requiring technical sales and service through direct sales coverage is indicated as the reason for the change.

The district to be served by the new sales office includes northern Illinois, northern Indiana, Wisconsin, Minnesota and northern Iowa.

• KAE Exhibitors Now Number 204

Five more firms have contracted for display space at the Knitting Arts Exhibition April 30 through May 4 in Atlantic City, Albert C Rau, show manager, has announced. These five—taking into account two exhibitors' withdrawals — bring the total exhibitors list for the KAE to 204 names.



Malcolm E Campbell, Dean of the School of Textiles, North Carolina State College, holds a water color painting by T B Hayward, chairman of the board of trustees of the Philadelphia Textile Institute and head of Swift & Company's Wool Department in Philadelphia. Mr Hayward did the painting from a photograph of Rio de Janeiro's harbor, showing Sugarloaf Mountain in the center, which was taken by Mr Campbell during his textile inspection tour sponsored last summer by the Brazilian government. The painting was recently presented to Mr Campbell in a Philadelphia ceremony and now hangs in the NCSC School of Textiles.

• AIEE Conference Dates Set

Two textile conferences sponsored by the American Institute of Electrical Engineers have been set for this month in Philadelphia and Atlanta, Ga, according to R S Gardner, in charge of Institute technical committee activities.

The conferences, at which electrical advances, developments and new applications in the textile industry will be reviewed, have been held for several years at Atlanta, Philadelphia, Boston and Providence.

The Philadelphia conference, which will be held in the Engineers Club on April 23 is jointly sponsored by the Textile Sub-Committee of the Philadelphia Section of the Electrical Institute and the Philadelphia Textile Institute. It is planned primarily for those from the North Atlantic States.

The Atlanta Conference, scheduled for April 26 and 27 at Georgia Institute of Technology, and held for southern textile technicians, is sponsored jointly by the Textile Sub-Committee of the Atlanta Section of the AIEE, the Philadelphia Textile Institute and the Georgia School of Technology.

On the Philadelphia program, the following subjects and papers are scheduled: "Principles of Static Electricity," L W Walkup, Batelle Memorial Institute; "Static Electricity, a Cotton Textile Problem," by a speaker to be named from the Institute of Textile Technology; "Synthetic Textiles and the Static Problem," Dr M Hayek, E I DuPont de Nemours and Co, Inc; "Static in the Woolen Industry," L A Runton, director of machinery research, M T Stevens Co; "Fundamentals of Good Electrical Installation Practice," Swaffield Cowan, Factory Insurance Assn; "Wiring the Loom," V F Sepavich, Crompton & Knowles Loom Works; "Electrical Installation on Full Fashioned Hosiery Machines," L M Marburger, Berkshire Hosiery Mills; and "Finishing Plant Electrical Installation Problems," J D McConnell, Cone Mills.

The four sessions on static electricity will be repeated at the Atlanta meeting.

Other sessions scheduled are: "The Eddy Clutch," K H Boehmer, Louis Allis Co; "The Card Drive Story," R E Parker and L T Jester, General Electric Co; "Design of a Textile Mill Power System," R B Wickham, West Point Mfg Co; "Considerations in Installations of a Mill Power System," J C Cummings, Bryant Electric Co, and "Problems in Operation and Maintenance of a Mill Power System," Dude Ray, Avondale Mills.

• Marine Magnesium Products Distribution

Whittaker, Clark & Daniels, Inc, 260 West Broadway, New York 13, New York, will continue to distribute marine magnesium products (magnesium carbonate, magnesium oxide, and magnesium hydroxide) under the trademark names of Maglite and Hydro-Magma for the new Marine Magnesium Products Division of Merck & Co, Inc, it is announced.

• Flow Regulation of Strategic Materials Advised

In a recent decision the newly-formed Chemical Industry Advisory Committee agreed unanimously that the National Production Authority, U S Department of Commerce, should adopt without delay a regulation to assure the orderly flow of strategic chemicals to defense and essential civilian uses.

Committee members pointed out that, while the chemical industry is expanding rapidly to meet greatly increased demand for its products, direction is needed for the distribution of some chemicals in tight supply pending the time when supply and demand can be brought into closer balance.

NPA discussed with the industry a proposed order similar to WPB Order M-300 under which chemicals were allocated during World War II. Officials emphasized that this basic order would not in itself place any chemical under allocation, but would provide the means by which any chemical might be allocated if a need for regulation was demonstrated. NPA also stressed that thorough study would be given to any chemical in short supply, including consultation with the industry advisory committee concerned, before placing it under controls. It was also noted that the proposed order provides for decontrol of any chemical allocated under it when control is no longer needed.

As an aid to small business, the proposed order provides that small users of chemicals may be exempted from allocation regulations.

The order would set up three categories for allocation, and a particular chemical could be made subject to any one of them, depending on its relative importance and supply.

• R S Aries Acquires Business of W Y Agnew

R S Aries & Associates, New York, consulting chemical engineers, have acquired the business of William Y Agnew, consulting chemical engineer also of New York in order to further expand the scope of their activities. Mr Agnew whose work has been in pigments, fertilizers and engineering design, was formerly employed by several companies including National Lead, Dorr and Imperial Chemical Industries.

The general engineering and drafting offices of the newly acquired company will remain at 500 Fifth Avenue, New York, while the executive offices will be transferred to the parent company at 400 Madison Avenue. Existing engineering facilities of the Aries organization located in Brooklyn, N Y, will be supplemented, it is stated.

• NYQPA Moves

The New York Quartermaster Procurement Agency, 111 East 16th Street, New York 3, N Y, has taken over the space formerly occupied by the New York Ordnance District Office located in the same building, according to a recent announcement by Brigadier General H L Peckham, USA, Commander of the installation. The new Ordnance headquarters are located at 180 Varick Street, New York 14, N Y (Telephone: ALgonquin 5-7700).

Both moves were necessitated by the urgent need of each agency for additional space resulting from constantly expanding procurement activities since the beginning of hostilities in Korea. The change has made it possible, said General Peckham, for the New York Quartermaster Procurement Agency to further implement administrative reorganization designed to permit the most expeditious handling of QMC procurement functions with a maximum of operating efficiency.

• APC Announces Four Emulsions Still Available

American Polymer Corporation, Peabody, Mass, has reminded compounders of leather finishes that despite shortages, the following four emulsions (listed in order of flexibility) are still available through the company: Polyco 1677-7C, Polyco 423, Polyco 319 and Polyco 1010-32. American Polymer points out that they are naturally compatible, enabling the manufacturer of leather finishes to mix them as required in order to obtain the degree of gloss, adhesion and flexibility desired.

Samples and data sheets (P-4, P-23, and P-25) are available.

• DCAT Silver Anniversary of Dinner

Over 2300 representatives of the drug, chemical and related industries from all parts of the country were attracted to the Silver Anniversary of the March Dinner of the Drug, Chemical and Allied Trades Section of the New York Board of Trade, Inc, held Thursday evening, March 8, at the Waldorf-Astoria, the largest dinner to date.

The principal speaker was the Honorable Paul W Shafer, Congressman from Michigan, whose subject was "Time of Decision." Charles P Walker, Jr (Chas Pfizer & Co, Inc), Chairman of the DCAT, presided.

Seated on the dais were many of the past chairmen who had been head of the DCAT during this quarter century, as well as officers of the leading national associations in the drug, chemical and related industries and government officials.

• 40 Mills Represented in FIT Spring & Summer Exhibit

Forty mills are represented in the very comprehensive Spring and Summer Textile Exhibit at the Fashion Institute of Technology, which opened on March 15 under the auspices of the Textile Advisory Committee of the Educational Foundation for the Apparel Industry.

The collection, in addition to a striking variety of silks, cottons, rayons and wools, features a display of buttons, zippers, ribbons and bindings as well as a group of fabric shoes and gloves.

Robert L Huffines, Jr, president of Burlington Mills Corp of New York and Co-chairman of the textile Advisory Committee stated before a group at the opening of the new exhibit that he was pleased with that committee's increased membership. He disclosed that there are now 47 members, almost all of whom had a hand in this latest display.

The exhibit is open to the general public on Mondays from 2-4 pm.

• New TRI Building

The Board of Directors of Textile Research Institute has approved plans for a new building which will add approximately 3,000 square feet of floor space to the Institute's present facilities at Princeton, New Jersey, according to an announcement by Dr John H Dillon, Director of Research. Steel has been ordered for the building which will be used initially to house the computing laboratories, shops, and other research equipment, nonchemical in nature. It is reported that chemical installations will be concentrated in the present laboratory.

• Fairview Mills Plant Three-Quarters Completed

The million dollar Fairview Mills Tricot Plant at Fountain Inn, South Carolina, is approximately three-quarters complete, according to a recent report from the Daniel Construction Company, general contractors for the project. The new 90,000 square foot plant for warp knitting, dyeing and finishing of rayon, nylon and other synthetic fabrics, is said to be completely air conditioned and finished in glazed tile throughout.

• AATT Votes to Limit Term "Rayon"

By letter ballot on fiber terminology, members of the American Association of Textile Technologists have approved limiting the generic term "rayon" to the manmade fibers of regenerated cellulose, and the specific term "acetate" to the manmade fibers of cellulose acetate.

• ICS Offers Textile Engineering Course

Providing a broad working knowledge of textiles and textile manufacturing processes as a base for later specialization is the aim of the School of Textiles at International Correspondence Schools in their new flexible home-study course, "Textile Engineering."

The first 12 sections of the course provide the "basic textile training" which all its students will get. They cover (1) Yarns and Fibers, (2) Fundamental Calculations, (3) Basic Physics and Chemistry, (4) Preparation of Fibers, (5) Carding, (6) Spinning and Winding, (7) Warping, (8) Weaving, (9) Supervision, (10) Applications of Textiles, (11) Textile Designing and (12) Finishing and Dyeing.

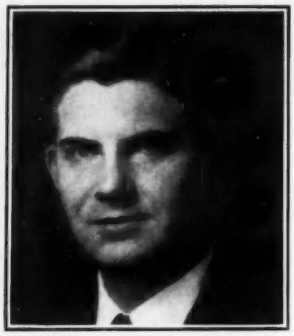
Then come five sections to train all students in basic engineering — Mathematics, Engineering Principles, Water, Heat and Air Conditioning, Electric Power and Lighting and Instrumentation and Electronic Control.

Upon completion of the course, the student may elect to specialize in one of the four main branches of textile engineering—manufacturing, engineering, chemistry or sales engineering. Depending on the option chosen, the student then studies such I C S subjects as Elements of Machine Design, Mill Engineering, Analytical Chemistry, Engineering Drawing, Salesmanship, etc.

PERSONNEL

GEORGE A URLAUB has become associated with the Lee Dye Works, Inc, Philadelphia hosiery dyers and finishers, in a technical sales service capacity. Mr Urlaub has for many years served the industry and government as a consultant and technical advisor. An AATCC member, Mr Urlaub has for the past three years conducted the hosiery course sponsored by the New York Association of Hosiery Mill Salesmen.

George A Urlaub



Dr Thonet C Dauphiné

DR THONET C DAUPHINÉ has been named manager of sales development of the Hooker Electrochemical Company. Dr Dauphiné had been associated with the Oronite Chemical Company since 1946 as eastern manager of product development and prior to that was a supervising engineer for the California Research Corporation. Both Oronite and California Research Corporation are wholly owned subsidiaries of Standard Oil Company of California.

MORLEY H CARPENTER, celebrating 50 continuous years service with Andreykovicz and Dunk, Inc, 88-year-old Philadelphia dyestuff concern, was recently presented with a gold wrist watch by fellow employees and a check from the company at a luncheon in his honor. A basket of flowers was given to Mrs Carpenter as "the woman who started him off with a good breakfast every morning for 50 years."

Mr Carpenter continues to work a very full day in his laboratory every day.

SIDNEY M EDELSTEIN, Technical Director of the Dexter Chemical Corporation, New York, has returned from a visit to Mexico where he surveyed that country's processing operations. Mr Edelstein observed that many more of the company's textile chemical specialties are being called for as a result of continuous expansion of their textile industry.

D J ECCLESTON has been named general manager of the Textile Chemical Division of the Warwick Chemical Company, a division of the Sun Chemical Corporation. Mr Eccleston was formerly sales manager of Suntone Pigment Colors for the company. Prior to joining Warwick, he was assistant general manager of the Glasgo Finishing Company, Glasgo, Conn.

DONALD M MARTIN, formerly sales manager of the Organic Chemicals Division, is now advertising manager of the Antara Products Division of General Dyestuff Corporation, New York.

JOSEPH W CONLON, supervisor of the Azo Area at the Rensselaer, N Y, plant of General Aniline & Film Corporation, has been promoted to production manager of the plant. JOHN H PAIGE, supervisor of the Triphenyl Methane and Nigrosine Area, has been named to succeed Mr Conlon as supervisor of the Azo Area, and JOHN J PRICHETT, senior chemist in the P D Department, will take over the duties formerly handled by Mr Paige. As production manager, Mr Conlon will succeed W LESTER DUNCAN, who will devote his full time to directing the Industrial Engineering program for the company's Rensselaer and Grasselli, N J, plants.

Stein, Hall & Co, Inc, New York, has announced the appointment of DANIEL H LIPMAN as assistant general sales manager. During recent years Mr Lipman, who has been with the company for many years, was manager of their New York sales office. He will be succeeded by EDWIN A O'NEILL, formerly manager of Stein, Hall's St Louis office. Mr O'Neill will move to New York shortly. Until then, the New York sales office will be in charge of EDWIN M CLEVAN who has been promoted to associate manager.

DR J CHARLES MOESSINGER has been named executive assistant to Dr Cary R Wagner, vice president in charge of operations of General Aniline & Film Corporation. Dr Moessinger, who recently completed his 30th anniversary with the company, will also continue his duties as technical coordinator of the company's foreign activities.

DR STILES M ROBERTS, associate director of the company's Central Research Laboratories at Easton, Pa, succeeds Dr Moessinger as research coordinator for dyes and intermediates at the Rensselaer, N Y, plant.

The Renssalaer, N Y plant of General Aniline & Film Corporation has a new senior chemical engineer in HOWARD S SMITH and a new chemist in DR WILLIAM R RUBY. Mr Smith comes from the United States Rubber Company's Naugatuck, Conn plant where he began in 1942. Dr Ruby was formerly a production operator at the Calvert Distilling Company.

DR ELMAR V PIEL has been made a project group leader at Evans Research and Development Corporation, New York, N Y. Dr Piel, recently a Teaching Fellow at New York University, was formerly employed in the technical sales department of the Barrett Division, Allied Chemical and Dye Corporation and as chemist with Hercules Powder Company and Shell Development Company.

Benjamin A Hammer

BENJAMIN A HAMMER succeeds HAROLD R HOLMYARD as manager of the New York Fiberglas Building, 16 E 56th Street. Mr Hammer has been a member of the Fiberglas organization since March, 1947, and comes to his new post from Syracuse, N Y, where he served during the last two years as resident sales manager.

Surpass Chemical Company, Inc, Albany, N Y, has added EDWARD A CHEVRETTE, 34, to its sales and technical services staff. A veteran of 16 years in the wet-processing industry, Mr Chevrette was most recently superintendent of bleaching, dyeing and finishing for the Brown Knitting Co, Warsaw, N Y.

E G HIBARGER, formerly Cincinnati district manager, has been appointed Chicago district manager in charge of the new Emery Industries office (see page 235). D R ROBERTSON, currently specialty sales representative in the Chicago area, and A R McDERMOTT have been appointed to the Chicago district as chemical sales representative.

At the annual meeting of stockholders of E F Houghton & Company last month in Philadelphia, the following officers and directors were elected:

AARON E CARPENTER — *Chairman of the Board.*

WILLIAM F MacDONALD—*President and Treasurer.*

R H PATCH—*Vice-President, Operations.*

D J RICHARDS—*Vice-President, Sales.*

E A CARPENTER—*Secretary.*

C P STOCKE—*Assistant Secretary.*

M A HEALEY—*Assistant Treasurer.*

JOHN F MAISCH—*Comptroller.*

C H BUTLER, H B FOX, J T EATON, W K BARCLAY and D C MINER—*Directors.*

The office of Vice-President, formerly held by GEORGE W PRESSELL, was abolished by change in the by-laws.

Among those in the textile industry who have thus far become affiliated with the leadership of a forthcoming $500,000,000 bond issue to be floated in the United States by the government of Israel are: ARTHUR I DARMAN, Arthur I Darman Co, Inc, Woonsocket, R I; ROBERT J GURNEY, Gastonia Combed Yarn Corp, Gastonia, N C; DAVID KLUGER, New Era Dyeing and Finishing Co, Inc, Fair Lawn, N J; ABRAHAM LEVIN, Levin-Goodman Co, St Louis; BORIS MARGOLIN, Tioga Silk Co, New York, N Y; HARRY C OPPENHEIMER, Brand and Oppenheimer, New York, N Y; JOSEPH SHULMAN, Shulman-Abrash, Inc, Paterson, N J; and DEWEY D STONE, Harodite Finishing Co, North Dighton, Mass.

JOHN L GILLIS, a vice president of Monsanto Chemical Company and general manager of the company's Merrimac Division at Boston, has been named to fill the post left vacant by the death on February 27 of WILLIAM G KRUMMRICH, vice president and general manager of the company's Organic Chemicals Division at St. Louis. CHARLES H SOMMER, JR succeeds Mr Gillis as Merrimac Division general manager. Both appointments became effective on March 12.

GLORIA J KEPPLER has been transferred from American Cyanamid Company's Textile Resin Application Laboratory to the company's Bound Brook sales office in the capacity of sales liaison.

Emkay Chemical Company has announced the appointment of WILLIAM JACOBSON as sales representative to sell and service the company's products in the New York metropolitan area. Mr Jacobson has had dyehouse experience with the United Piece Dye Works and the Modern Central Silk Dye and Finishing Company. He has had prior sales experience with Wollen Chemical Company and the Olive Oil Soap Company.

William Jacobson

H H Pact

H H PACT, formerly with E F Drew & Company, has joined the staff of Glyco Products Company, Inc, Brooklyn, as a technical representative for the New England district with headquarters at 64 Lindy Avenue, Providence, R I. Mr Pact spent several years as manager of E F Drew's textile department in Boonton, N J and later as district manager in New England of the Technical Products Division.

GEORGE B McCULLOCH, of American Cyanamid Company has been transferred from the Textile Resin Application Laboratory to the Philadelphia office, where he will work as technical salesman.

Two changes in the management of Burlington Engineering Company, fabricators of stainless steel dyeing equipment, were recently announced by J Saunders Williamson, president of the Graham, N C firm.

EDWIN H WILLIAMSON has joined the company as vice-president in charge of manufacturing and J A OKEY, former vice-president in the sales department has left. Mr Okey has made no announcement with reference to his future plans.

WALTER NEWCOMB will continue as secretary of the company.

TECHNICAL LITERATURE

Micromax and Speedomax Speed Recorders (Catalog N-27)—Leeds & Northrup Company, 4934 Stenton Avenue, Philadelphia 44, Pa—a revised 20-page edition which discusses and compares the principles of operation of both instruments and points out the special advantages of Speedomax where unusual requirements must be met. Illustrations of speed recorder installations serve to show the products' versatility and adaptability. Also included is information on a new line of tachometers.

Available on request.

PB 98573r *Summary of Specification Requirements for Quartermaster Textiles Revised 1951*—Office of Technical Services, U S Department of Commerce, Washington 25, D C—a revised statement of specification requirements for QM textiles. This report was issued for the first time in 1949. The new statement lists changes in specification numbers as well as current requirements for each item, including both cloth construction and finish requirements in terms of specification tests. Included are data on cotton fabrics, including plain weave, twill weave, ducks (grey-dyed-finished), napped woven fabrics, pile weave, knitted fabrics, woolen and worsted fabrics, rayon fabrics, nylon fabrics, mixed fiber fabrics, pressed fabrics, silk fabrics, narrow fabrics and finishing and after-treating specifications.

This 129-page report is recommended to firms currently planning to submit bids to the military services for textiles, or those concerned with phases of mobilization planning of their production in the event of a large scale emergency.

Three dollars and twenty-five cents a copy. Orders should be accompanied by check or money orders payable to the Treasurer of the United States.

A Test for Mercerization in the Presence of Dyes—Dexter Chemical Company, Box 1, Blvd Station, New York 59, N Y—a study on mercerization, of particular interest to technicians concerned with meeting military specifications for fully mercerized cotton fabrics. Because of the relationship between mercerization and the tensile strength and wearability, the barium hydroxide absorption method for measuring the degree of mercerization in cotton fabrics is adequately covered.

Available on request.

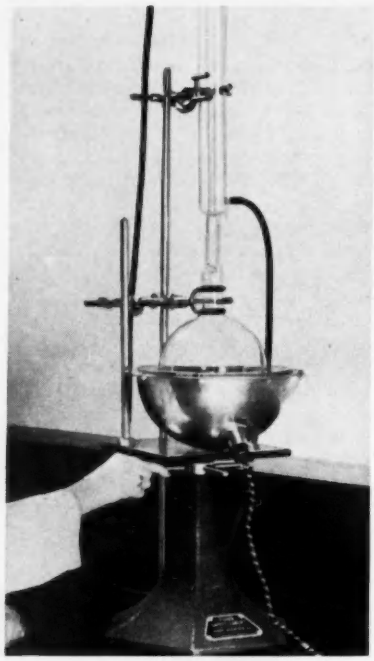
NEW PRODUCTS

• Universal Speed Bridge Thermometer

The Universal Speed Bridge, a self-contained and portable electronic thermometer or pyrometer covering the entire useful temperature scale has been brought out by Weiller Instruments Corporation, 95 Broad St, New York 4, N Y. A steel case 12" x 7" x 8" encloses the bridge, power supply and electronic null indicator.

Reports state that the entire range from —200°C to 1600°C can be covered with two types of bulbs. Ranges are changed by exchanging two plugs containing bridge arms. Three ranges are available using two toggle switches.

The instrument, which reportedly can be plugged into any 115 V 60 cy line, is equipped with a 10-turn geared dial that makes 1000 divisions available.



Fisher Safety "Lablift"

• Safety "Lablift"

Easy positioning of heavy and/or hot laboratory equipment at various levels above the workbench is afforded by a device manufactured by the Fisher Scientific Company, 717 Forbes St., Pittsburgh 19, Pa. The mechanism, known as the "Fisher Safety Lablift," has a platform, which can be adjusted to any point from 11 to 18½ inches above the workbench by turning a screw-support to which the platform is attached. The improved laboratory aid is said to be more stable and easier to operate than previous models or makeshift devices.

Heavy kettles, reaction flasks, cold and hot baths, and similar vessels are reported to be held safely or moved up or down so that they can be attached or removed from reaction trains, etc. Both the movable platform and the base have upright cadmium-plated rods for holding clamps, thermometers, stirrers, etc.

• Calconyl Red B

Calconyl Red B, an azoic dye of bright bluish red for cotton printing, has been announced by the Calco Chemical Division. The new color, available in either double or single solution, is reported to be different in chemical nature than similar color types now on the market. Calco states that Calconyl Red B has a high degree of stability in storage and good printing properties as well as being economical.

• Air-Drying Plastic Coating

Development of a new air-drying plastic protective coating has been announced by the United States Rubber Company for the protection of tanks, tank cars, pipes, fittings, structural steel parts and chemical processing equipment against attack by splash, drip and spray from corrosive chemicals, corrosive atmospheres, weathering and rust.

The plastic, said to combine high film flexibility with good adhesion and impact resistance, will not chip or crack and can be used on steel, aluminum, concrete, hardwood, or composition board, it is reported. It is applied by spray and requires approximately one hour drying time between coats and 24 hours drying time after the final coat. No primer is needed and it can be produced in a variety of colors, the manufacturer states. With no chemical plasticizer to leech out or harden, it is said to retain its flexibility throughout its service life.

A sharp instrument will cut through the film but the break can be repaired easily by "touching up" with brush or spray. U S Rubber recommends that metal be grit or sand-blasted before the coating is applied and that cement be etched with hydrochloric acid; wood and composition board needs rough sanding to assure a good bond.

The new coating is in pilot plant production at the company's Providence, R I, plant. It will be marketed by the mechanical goods division under the trade name U S Royalguard protective coating.

OBITUARY

George W O'Keeffe

GEORGE W O'KEEFFE, 57, died February 11 at his home in Elkins Park, Pa, after a long illness. Mr O'Keeffe was vice-president in charge of sales for the Dryer Division of Proctor & Schwartz, Inc.

Born in New York, N Y, in 1894, Mr O'Keeffe was graduated from New Rochelle High School and Stevens Institute of Technology. He served in the U S Army during the first World War as a 1st Lieutenant.

Shortly after the war he joined Proctor & Schwartz, Inc, as a sales representative. Except for a short while, when he left them to work for Filtration Engineers, Inc, Newark, N J, he had been associated with Proctor & Schwartz, Inc, continuously. He was named sales manager of the Dryer Division in May, 1943, and shortly thereafter was promoted to the vice-presidency.

Mr O'Keeffe is survived by two children, George, W Jr, 14, and Consuela, 17.

Harold C Meegan

HAROLD C MEEGAN, 58, long associated with the Nopco Chemical Company of Harrison, New Jersey, died suddenly on February 25.

At the time of his death, Mr Meegan was sales manager for the company's Textile Specialties Division, a post he had held for more than ten years. He joined the Nopco organization in 1922 as a sales representative and traveled extensively throughout the eastern states until 1940 specializing in the sale of textile processing chemicals.

Mr Meegan was a long-standing member of the New York Section of the AATCC and of the Textile Research Institute.

He made his home in Interlaken, New Jersey.

BOOK REVIEW

THE ANALYTICAL BALANCE —Its Care and Use

William Marshall MacNevin

Handbook Publishers Inc
Sandusky, Ohio—1951
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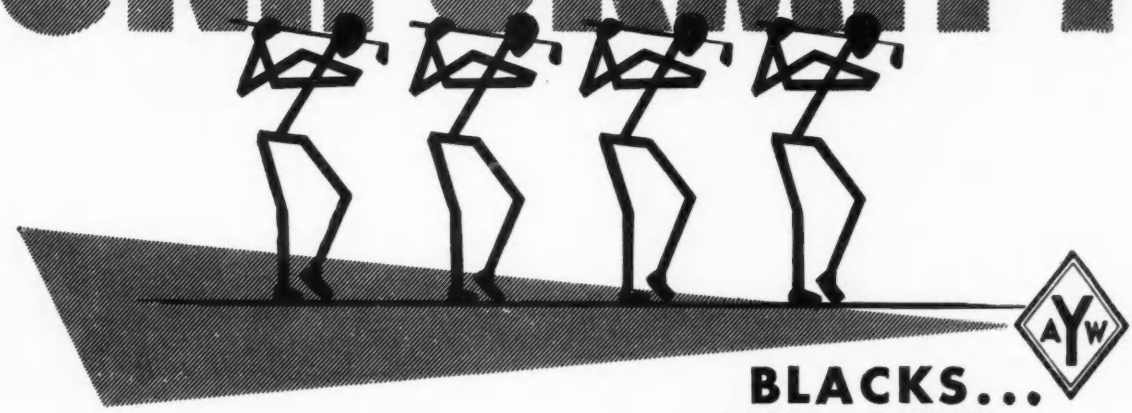

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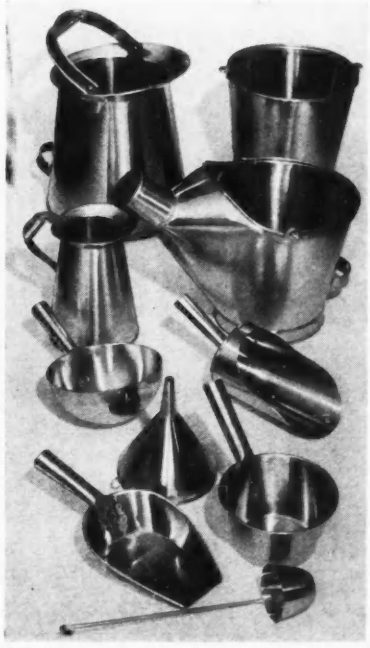

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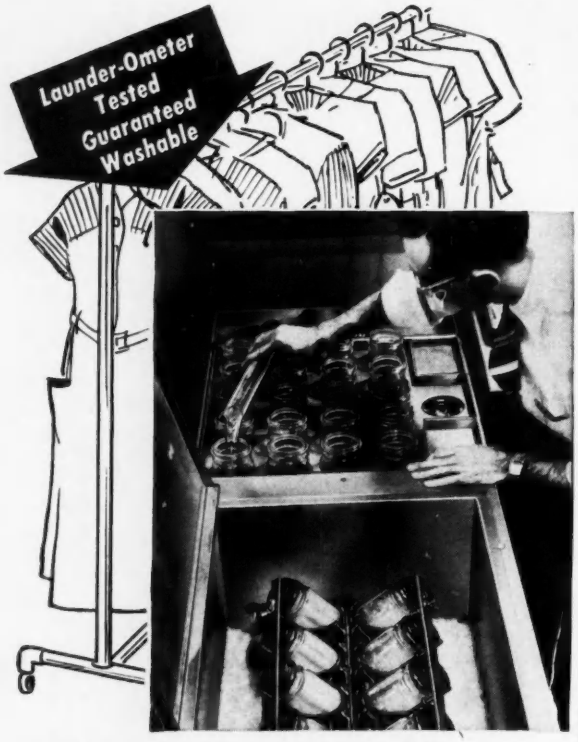

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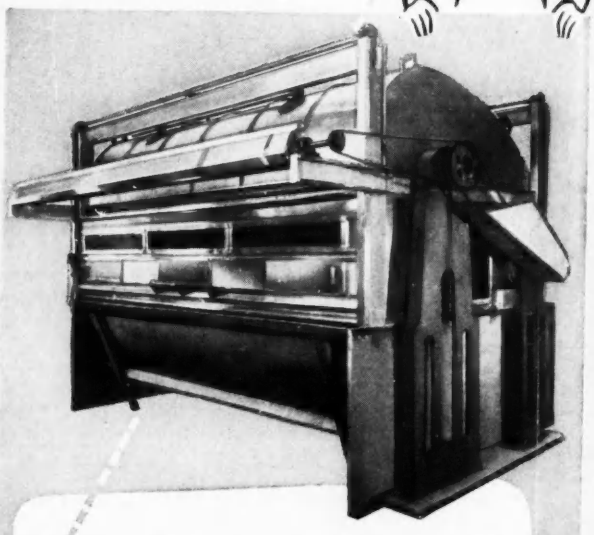

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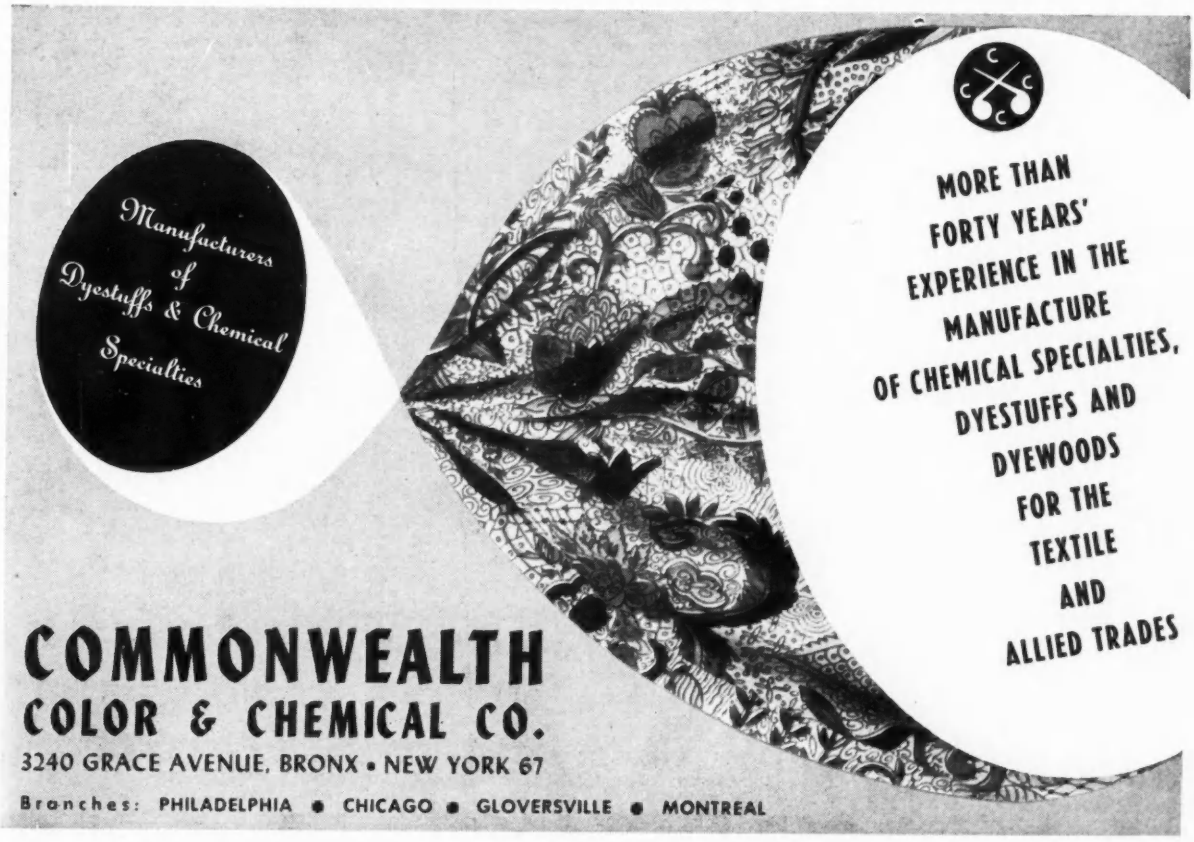

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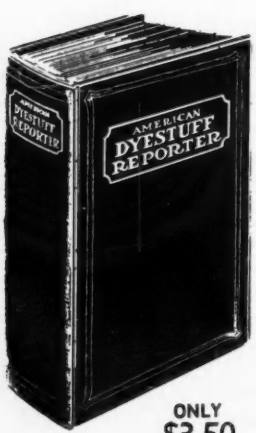

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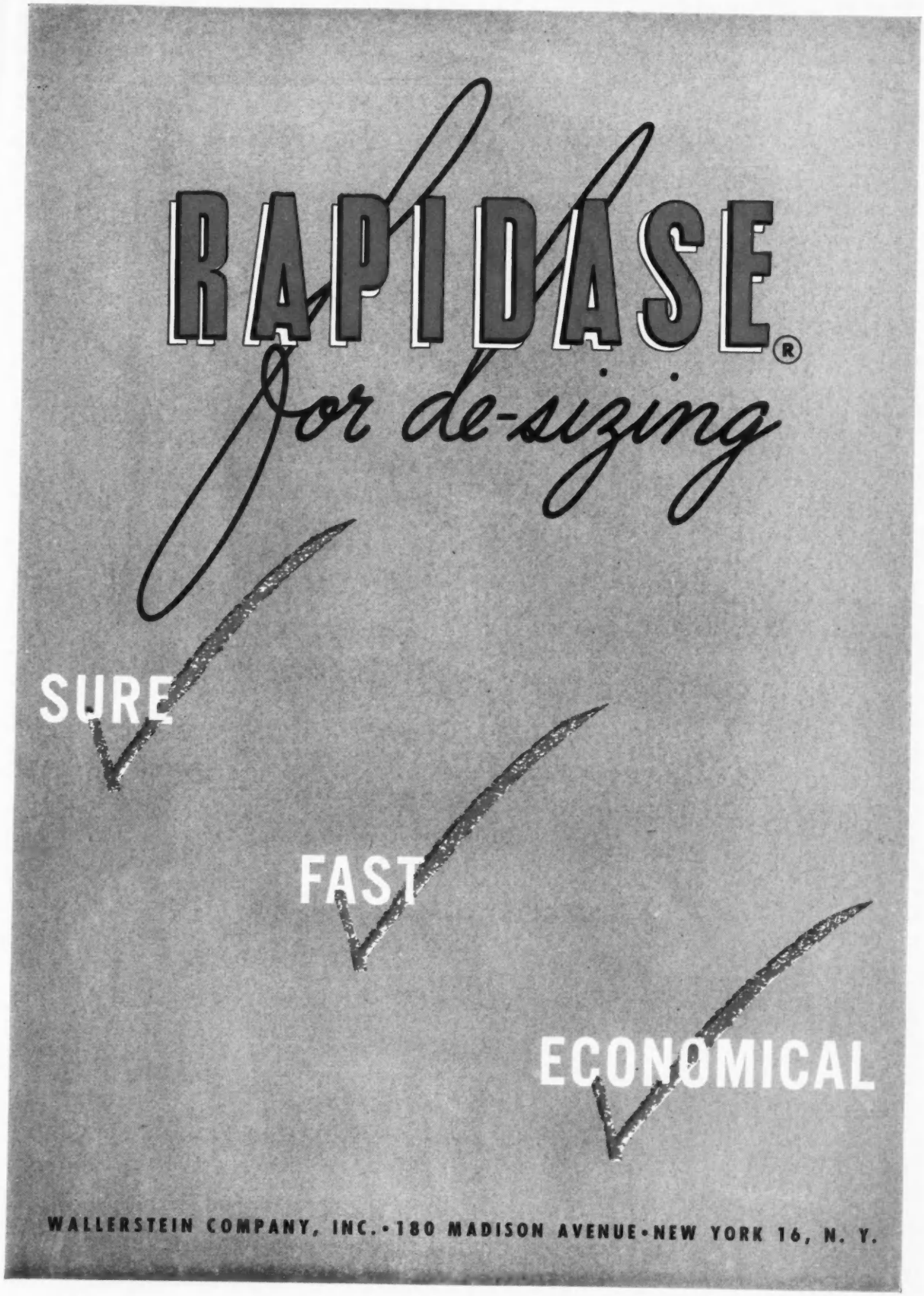

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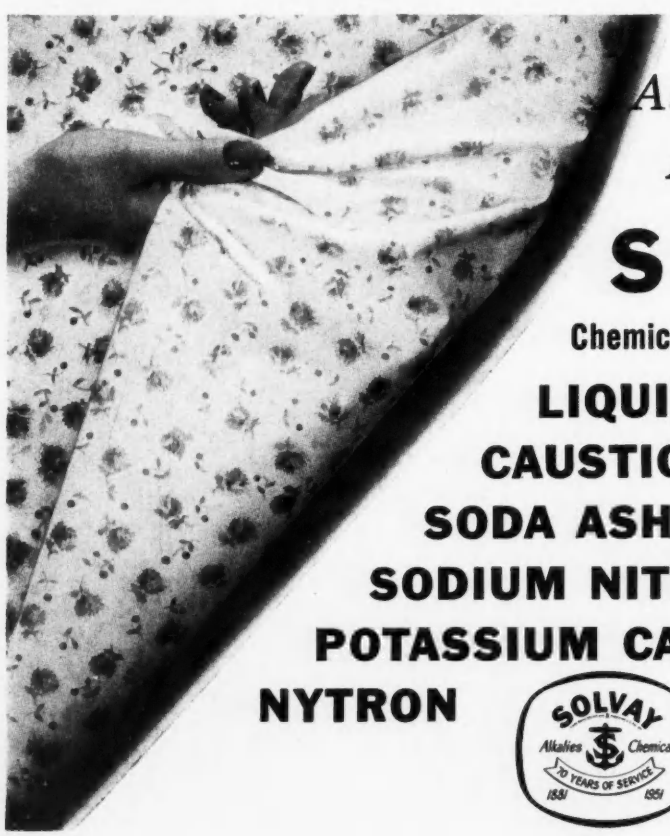

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